Home Nursing and Hygiene Hand-Book

St. Andrew's Ambulance Association

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PREFACE.

THE present work is the official text-book of the St. Andrew's Ambulance Association on the subject of Home Nursing and Hygiene. It is published by the authority of the Council, and has been prepared under the supervision of the Medical Committee of the Association. Mr. Edington has contributed the chapter on Surgical Nursing, and also the accompanying illustrations. For the rest I myself am responsible.

J. W. A.

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HOME NURSING AND HYGIENE.

CHAPTER I.

Introduction—Nurse's Relation to Patient and Doctor—The Sick-Room, its Selection, Preparation, Temperature—Bed and Bedding—Water-Bed, Air-Pillow, Bed-Rest—Changing Sheets.

The widespread interest that is taken in first aid and in sick nursing is a notable feature of the present day. It is a sign of the times, as people say. It is a sign that we are impressed by the many dangers that the developments of our modern civilisation have brought in their train; and self interest compels us to consider how we can best look after ourselves, or rather be looked after, if we should be visited with some such misfortune as we see so frequently befalls a neighbour. But this widespread interest is not altogether selfish. It is a sign too of the growth of the humane spirit which has been so distinctive a feature of recent times. If the dangers make us consider the help that we ourselves may need, the humane spirit prompts us to come to the help of others. Under these two influences first aid and sick nursing have rapidly advanced in our own day. They have the same object in view. It is only that first aid has to do with the occasion of the injury, while sick nursing is first aid continued until the

trouble is over. This aid, therefore, in either form is not a simple matter. Many kinds of dangers mean many varieties of injury and disease, and call for many forms of relief. And so in order that our aid may be adequate and efficient, it must be skilled.

Confining our attention to our present subject, sick nursing, we shall readily understand how great are the demands it makes upon all who are in charge. It deals not with the moment alone, but with a period whose duration one may be unable to foresee, where every moment may bring a new danger, and every danger call for new resource and care. These are mainly the considerations that have forced the study of sick nursing upon the attention of us all.

Now, it must be quite obvious that this skill can only be thoroughly acquired by practical training and experience; and yet at the same time it is true that much useful knowledge and some confidence in one's capabilities as a nurse can be gained by such a training as our Association is able to afford.

Nurse's Relation to Patient and Doctor. The nurse's primary duty is to attend upon her patient. She has duties to the doctor, it need hardly be said, but they arise entirely from her obligation to fulfil to the best of her ability her duty to the patient. She must watch him, that in his weakness he comes to no harm; wait upon him, that in his helplessness he lacks nothing that he needs. To know where the harm comes in, to be able to protect him from evils that he might perchance bring upon himself; to know what are his needs, and how efficiently to meet them—all this is the grand object that the nurse must have constantly in view.

Then there is her duty to the doctor. There are his instructions which must be faithfully carried out; and to be carried out at all they must be understood. Again,

the nurse must be able to give the doctor an intelligent and concise account of the patient's condition since his last visit. All this requires training, a training through patient and persevering effort, if the needed knowledge is to be gained and the work to be well done.

The Sick-Room—Its Selection. The first consideration as regards the general care of the patient is to see that he is provided with a room that will as far as possible meet all the necessities of his case. He is going to be restricted for some time to one room, and he will therefore wish one that will be most congenial to him; or if he is so ill as to be indifferent to his surroundings there is all the greater need for these surroundings being the most favourable possible in all respects.. The situation of the sick-room is therefore a matter of much importance. It is well that it should have a southern or a south-western exposure, and it ought to be a large room. The patient wants all the life-giving influence of the sun obtainable; and if on a summer day the light be too strong, a green cotton blind will afford a ready and inexpensive remedy. There is this in favour of a south-western exposure, that the patient does not want light in the early morning, when probably he inclines to sleep; and, on the other hand, one need hardly be told that a bright and cheerful afternoon enhances by contrast the rest and quiet of the night. The room should also be large, as that affords the most efficient ventilation with the least amount of draught. For these reasons it may be necessary to convert a sitting-room into a bedroom.

But there may be special circumstances which will determine the selection of the sick-room. Isolation may be of the first importance, as in the case of an infectious disease, or in the case of one in which the most perfect quietness is demanded. A convenient supply of water

and the ready disposal of the sick-room slops will in some instances be the chief consideration; and it will frequently be of the greatest advantage to have a room opening out from the sick-room. Some of these points will be considered later under special disorders. At this time of day it should be unnecessary to add that no room is habitable if it has not a fireplace.

Preparation of Sick-Room. Much may require to be done to get the sick-room made suitable for the reception of the patient, and special cases may require special preparations for their adequate nursing. In every case the room must be first thoroughly cleaned, aired and dried. It is not advisable to wash a floor if it cannot be quite dried before the admission of the patient, but the woodwork, cupboards and floor can at least be gone over with a damp cloth. The furnishing of the sick-room should be as simple as possible without being cheerless. Articles of furniture that are not needed and that are in the way should be removed; they only catch dust, cause unnecessary work, and take up room. Stuffed chairs, heavy draperies, and all manner of curtains should be excluded, though in certain cases something light and easily washed might be needed as a protection from draughts. It will be pointed out later that in certain infectious cases only such plain furniture is admissible as can be readily cleaned and disinfected, or ungrudgingly destroyed. If a carpet should be considered necessary in order to have the greatest amount of quietness, it should be a light square that can be easily removed and cleaned. As a decoration one can always have a few flowers of bright attractive colours, but they should have little or no odour, and they should never be left in the sick-room during the night. In cases of prolonged illness even the pictures and the wall-paper may have to be considered; but should these ever prove a disturbing element, it may

probably be best to give the patient a change of room. Creaking doors and squeaking shoes will serve to illustrate a whole host of accidental evils that are not trifling. And here let us add that all unavoidable conversation should be carried on in a low tone, but not in a whisper; and all talking at or near the bedroom door should be prohibited.

Temperature of Sick-Room. The temperature of the sick chamber is always a matter of importance, and may be of the first importance. It is well, therefore, to have it under exact observation by means of a thermometer placed near the patient's bed, or at least quite away from the fire and window. As a rule, the temperature of the sick-room should be from 60° Fah. to 65° Fah., and in some instances 70° Fah. In no case should it ever be allowed to fall below 55° Fah. The higher temperature of 70° Fah. may be called for in certain affections of the larynx; and altogether diseases of the respiratory organs do better with a warm room. The lower temperature of 60° Fah. is most agreeable to fever patients. Rheumatic affections demand both a warm and an equable temperature. The very young and the very old, and patients who are able to sit up for a part of the day, should have their room at a higher temperature than would otherwise be considered necessary.

To maintain a uniform temperature without a disturbance of the fire or of the patient may be a matter of no small difficulty. It is a question of careful stoking. Small pieces of good coal should be selected and arranged beforehand, so that they can be dropped in quietly with the gloved fingers at judicious intervals. With a proper grate and a good-going chimney there should be little difficulty in that matter. The refinements of wooden shovels and pokers of stick may be discarded. There should always be, at least, a warm temperature of the

room while the patient is taking his meals; and if at other times it should perchance become too low, he can be protected with the bed clothes. The nurse must never light the gas in the room merely as a means of heating. Any slight rise in the temperature of the apartment is more than counterbalanced by the amount of oxygen consumed and carbonic acid and other impurities formed.

The Bed. It has been said, with some truth, that the best bed for an invalid is his own. But undoubtedly, if the illness is a serious one or likely to be prolonged, or if it be a surgical case, it is better to have a bed that will meet all the possible necessities of the complaint. For all cases it is best to have the framework of iron or brass, with either the old-fashioned straps of iron across, or with the newer woven-wire mattress. For an adult the bed should be about 6 ft. 6 in. long, and had better not be more than $3\frac{1}{2}$ ft. wide, and as the patient lies upon it, $2\frac{1}{2}$ ft. high. If it is too wide, the nurse cannot conveniently reach the patient; if it is too high, it adds to the difficulty of raising him; and if it is too low, the stooping required becomes very irksome, and to lay the patient as gently down as need be may demand the exercise of very considerable strength. If there is a rail at the foot of the bed it should be a low one.

Bedding. Whatever be the kind of bedding used, it should be of uniform consistence, cool, and capable of being easily cleaned; the surface should be as flat as possible, and yet the whole should have a certain degree of spring about it. There is nothing better than the patent woven-wire mattress referred to, with a well-stuffed hair mattress on top. A well-packed chaff or straw mattress will do fairly well; it is cheaper, and can easily be renewed. The plan of having two hair mattresses, alternating them so that the under one of

yesterday will be the upper one of to-day, is highly spoken of by some. "Those who have not tried this simple way of securing a change," says Miss Rachel Neuman, "will hardly believe the comfort it affords to a helpless patient." The feather bed is the worst bed of all. Its very yielding character makes it unsuitable for many complaints, and almost all invalids speak of it as close and heating.

Pillows, though usually of feathers, should not be too soft, and the bolster should not be covered by the under sheet. This under sheet should, as a rule, be of cotton, which preserves a more uniform heat than linen, and it should also be of sufficient size to admit of being well tucked in under the mattress at top and bottom and on both sides. For there are two things about the management of the sheet that must be attended to. It must as far as possible be kept perfectly clean and perfectly smooth. It must have neither spot nor wrinkle if the patient is to be thoroughly comfortable. To keep it so, it may be necessary in some cases to use a draw-sheet.

This draw-sheet is made of a piece of old soft sheeting, folded lengthways to about 30 in., or sufficient to extend from the patient's shoulders to his knees. It is placed over the under sheet (with or without the addition of a piece of mackintosh) to protect it from the soiling that in some ailments may be hardly avoidable. It is equally necessary that the draw-sheet be kept stretched and smooth. It should, therefore, be frequently looked to, and its ends pushed well in under the mattress.

With regard to the remaining bed-clothes, it need only be said that, as a rule, there should be an upper sheet of cotton immediately over the patient; and for warmth and lightness the looser and fluffier the texture of the blankets the better. In a case of acute rheumatism it will often

be advisable to have the patient lying between blankets and wearing a flannel nightdress. A particular joint may be so acutely painful that a bed-cage is required to keep the weight of the blankets off the part.

As to the position of the bed in the room, it should, if possible, be away from the wall on all sides, to admit of free access to the patient; and we shall see, when speaking of ventilation, that if the bed be between the door and the fire, or between the window and the fire, special precautions must be taken to prevent exposure to draughts.

Water-Bed, Air-Pillow, Bed-Rest. Many additional appliances have been devised to contribute to the comfort of the bedridden invalid. A demonstration of some of these, and how to use them, will be of more service to the learner than any detailed description of them here. The water-bed, which may be either full or half size, is used in cases of prolonged illness, associated as these cases usually are with more or less emaciation. It has the advantage of being smooth and not needing to be 'made': and by yielding a little at every point it effects its purpose of giving complete and uniform support to the wearied body. The empty water-bed must first be placed upon the palliasse, and the water at a temperature of about 70° Fah. is then poured into it until it contains so much that the patient is fairly afloat. This can be tested when the patient is on the bed by passing one hand under it, and the other over it below the patient, and carefully noting whether or not the fingers of the two hands meet, which of course, they should not do. The water-bed can be filled while the patient is on it by simply raising up the feed-pipe, and pouring the water into it from a jug in the usual way. The common error of filling the water-bed too full must be carefully guarded against. It should just be sufficiently full to prevent, as we have said, the two

surfaces touching each other while the patient lies upon it. An exhausted patient, with the ruling passion for punning strong in death, once said that he felt quite at sea on his water-bed. The nurse had over-filled it, and he was much less comfortable than he had been before using it.

The air-pillow is very convenient and quite as effective where pressure has to be taken off a limited area. The circular collar form is often used to relieve the pressure over a threatening bed sore.

The bed-rest is of great service when the patient is able, or may require to sit up in bed. It has a framework of light wood with a canvas or a woven-wire back; and it should be capable of being raised or lowered to different angles. It must be well padded with pillows to give due support to the back and head. The back of a chair turned upside down may form a good and handy substitute. But here again we must call attention to a common mistake, namely, the process of propping up the patient with more and more pillows, as by the resistance to his back, he gradually moves further and further forward. The result is simply that this progression of the patient only ceases when the supply of pillows and cushions becomes exhausted. A chair or stool, and a couple of pillows will often suffice if the patient be only gently lifted back from time to time. The apparatus of surgical practice will be referred to later.

A little table at the side of the bed, on which any odd article such as a cup or a book can be put is often of great service. It becomes the proper place for putting things that otherwise might get littered about the bed.

Changing Sheets. Much attention has been directed to this from the fact that those cases which most urgently call for the frequent changing of sheets, are those in which the patient will least admit of being moved about. To

the inexperienced the problem may be one of great difficulty, so far at least as the changing of the under sheet is concerned: of this therefore we must say something. Fortunately there is general agreement among experts as to the two best methods of doing this in the case of the most helpless. The first method is as follows. The pillows and bolster having been removed, the soiled sheet is freed at the top of the bed and rolled down to the patient's neck, while his head is supported, if need be, by one hand of an assistant. The top of the clean sheet is then fixed properly in at the top of the bed and enough of the sheet smoothed down to admit of the bolster being replaced over it. The lower end of the clean sheet will now be in contact with the upper end of the soiled one, and the former must then be drawn down as the latter is being rolled up and removed, the patient meanwhile assisting, if that is permissible, by raising himself slightly on his elbows and feet. This method is the better one if the patient can be moved a little and the nurse has no trained assistant. The other method only differs in that the sheets are changed from the side. The pillows and bolster are removed so that the patient lies flat in bed, and the nurse turns him gently on his side away from her. The soiled sheet is now loosened down the side and rolled up close to the patient's back. The clean sheet, which has been carefully folded lengthways in small alternate folds rather than rolled, is brought close up to the soiled one, and as the latter is pulled out under the patient from the opposite side by an assistant, the nurse pushes the free end of the clean sheet under him, he meantime moving round on to his back. The clean sheet will then only require to be drawn smooth and fixed on all sides. The advantage of the small alternate folds in the case of the clean sheet is that its free border can be pushed under the patient practically without moving him, a matter of

absolute necessity in some particular ailments. But in these difficult cases the nurse will depend on a good wide draw-sheet, which can always be readily drawn across the bed from under the patient while the clean draw-sheet, pinned or tacked to the soiled one, is drawn at the same time under him. All this, however, requires demonstration and frequent practice.

CHAPTER II.

Observation of Symptoms: Colour of Face—State of Skin—Posture—Pain—Sleep—Appetite and Thirst—The Temperature and how to take it—The Pulse—The Breathing—The Excretions.

Having considered where and how the patient is to be put up, we turn to the patient himself. He is the nurse's first care, and she is entirely responsible for this care throughout the whole interval between the doctor's visits. It is no light duty; and to become fitted for it requires careful observation, tact and judgment. Observation comes first. How is the beginner to observe, or rather, how is she to learn to observe. Well, this learning to observe is a process, and only the method of procedure can be indicated here. She must begin by constantly and determinedly keeping her eyes about her, so as to practise the observation of common objects. Then with her patient she will continue this habit of observation; and if she cultivates it diligently she will soon be surprised at her own alertness. She will realize that such and such a thing that she has noticed she would certainly have overlooked before. Something trivial we shall suppose, for it is not the importance of the thing observed, but the fact that it was observed at all, which is the point in the first instance. Such is the plan which the learner should adopt who means to prosecute sick nursing as a special calling.

But to our present subject. Why is there this need for careful observation of everything? Because as regards the care of the patient nothing is trifling that need be done at all; and as regards reporting the fact, the learner cannot tell what is of consequence and what is not. In a sense therefore there is no limit to the exactness of observation demanded; and yet the kind of things to be noted can easily be stated and acquired, so as to fit the nurse for more independent and minute observation.

There is first of all this general principle to be remembered. It is not so much the patient's constant condition that the nurse has to note, but rather such changes as may occur in his condition during the doctor's absence. It may be some alteration in the patient's expression, manner or temper, the appearance of perspiration on the hitherto dry and fevered skin, some such new feature in the course of the disease that may indicate a turn for better or for worse.

We shall now mention some things about the patient that the nurse should observe.

1. **The Colour, Outline and Expression of the Face.** The amount and depth of the colour may not only indicate the degree of feverishness, but the particular fever. The flush may be bright or it may be dusky; it may be over the face generally, or confined to a particular area. It may change readily, or it may be constant. There may be a rash in addition to the flush. Any other change of colour or appearance of the face should be noted; for example, the yellow tinge of the skin and of the white-of-the-eye which is a symptom of jaundice. Sudden paleness naturally suggests danger; and whether it is simple faintness or something more obscure and possibly dangerous, must never be overlooked. In certain forms of paralysis the outline and expression of the face undergo

alteration, most marked in those cases in which the face is drawn to the sound side by the unaffected muscles, now no longer opposed by those of the other side which have lost their power. A general dropsy may first show itself in a puffiness under the eyes; and the eyes themselves may be altered in various ways in different diseases. It may be that some peculiarity in the expression alone will attract attention and be the indication of an important change.

2. **The State of the Skin.** The estimation of the heat of the skin comes under "Temperature." But there are many other points to be noted regarding it, such as the presence of perspiration. This latter is sometimes the accompaniment of a decided change for the better, as at "the turn" or crisis of a fever; sometimes it means that the disease is worse or at least that the patient is weaker. It is often confined to the head, especially in children. The perspiration of rheumatic fever has a peculiarly heavy, sour odour, and may not indicate any turn in the fever. A livid or bluish tinge of the skin about the lips, eyes, cheeks and fingers, as a sign of interrupted or weak circulation of the blood or of its being imperfectly supplied with air, is always to be noted.

3. **The Posture.** By that we mean how the patient lies or sits. He will select the posture or position in which he is most comfortable; or if he has pain at any part he will keep off that part, except in some forms of nervous pain in which pressure gives relief. It may be of great consequence, then, that the doctor should be informed of some particular posture that the patient is observed to prefer. It is a common remark, and often a correct one, that whereas at the beginning of a pleurisy the patient will lie off the painful, that is, the affected side, he will at a later stage lie on the affected side because the pain has now left the part and he gets a

freer use of the sound lung for breathing. Here, we repeat, the point is that it would be an evidence of careful observation on the part of the nurse, and might be of great importance in the case, if she took note of this change of posture and reported it, although she had no idea of what it meant. It is a feature not only of certain diseases of the lungs, but of the heart also, that the patient requires to sit up in bed for breath. The nurse would note to what extent that occurred. On the other hand, it is a good sign if he can lie with his head a little lower; and if he can lie on his back with the head ordinarily low there is no difficulty of breathing, unless it be that he is so extremely ill as not to be conscious of the difficulty. Persistent lying on the back is a feature of exhaustion or of an advanced stage of a severe acute disease, especially if the patient tends to slip down into the hollow of the bed. This indicates that he is more or less indifferent to his condition, perhaps unconscious of it. If the patient is suffering from an acute complaint of the abdomen it is favourable if he can lie with the lower limbs extended; unfavourable if he draws them up to get relief from pain.

4. **Pain.** Its character, time of occurrence and situation must always be carefully noted. Is it limited in area or widespread; does it shift from place to place? If not continuous, does it return invariably about the same hour of the day or night? Is the pain increased, or is it relieved by movement; has it any relation to the taking of food? The character of pain is endless in variety, and a great number of terms are used to express different kinds, such as dull, aching, burning, throbbing, darting, etc. And here we would remark that however difficult it may be for the patient to describe his pain, the nurse should avoid suggesting to him a term that seems to describe it, or indeed any symptom of which he complains.

Far better is it to get the account of the symptoms from the patient in his own words, however grotesque they may seem to be. It is for the doctor to put his interpretation upon them.

5. **Sleep.** The amount and character of the sleep is a matter of the first importance in disease; for in most diseases we have this difficulty to face, that where rest is most needed it can least be had. In the short, sharp disorder that we call acute disease this is always true. The patient must fight it out. If he sleeps, he sleeps at best in his armour. The nurse will therefore note the little snatches of sleep that may be all that is obtainable, and she will put together the sum total for the doctor's information. As to the character of the sleep, did it seem to be restful, or disturbed; was there any movement or muttering, or, as in some disorders of children, any piercing cry? The beginner may find it hard to distinguish between a sound sleep, which is very life to the patient, and one which may betoken a state of increasing gravity. When there is deep snoring the doctor calls it *stertorous* breathing, and that is one of the symptoms of serious disorder of the brain. It may, however, be simply due to some obstruction of the nasal passages.

So important is sleep to the sufferer that it is recognised as a sound rule that if the patient is sleeping naturally he is not to be awakened even for the administration of food.

6. **The Appetite and Thirst.** These have, like sleep, invariably a place in the nurse's chart for note-taking. Meanwhile, we only observe that the nurse will record the amount of food taken, of what it consisted, with what frequency it was taken, how relished, and with what after-results, if any, to the patient. And so with thirst. Is it constant, yet easily quenched; as from a parched tongue that a small piece of ice will relieve? Or is the

thirst excessive and never satisfied, though large quantities of water be taken?

7. **The Temperature.** The observation of the temperature has become a most valuable aid in the detection and estimation of disease. It is so because in health the temperature practically never varies. Whether we be in the sunny south or amidst perpetual snows, if we are well, our temperature remains the same. We say we feel the heat or our hands are benumbed with cold; but the temperature of our blood or of the internal parts of our body is not materially affected by such diverse external conditions. On the other hand, one of the first indications of disease is a rise of temperature, possibly such a rise as only the thermometer can detect, the patient himself perhaps feeling nothing wrong, or at most a sense of chilliness in place of the feverishness which is actually developing. But another reason why it is so valuable a guide to disease is because we have an exact method of ascertaining it; and this duty being almost always left to the trained nurse, it is necessary that the learner should study carefully how to take the temperature, and how to record it accurately when it is taken.

The temperature of the body, or of anything, is ascertained or "taken," as we say, by means of the thermometer; and it becomes a gauge of the particular temperature on account of the natural law which applies to all matter, that heat causes expansion. For this reason the mercury or quicksilver in the bulb and tube of the thermometer will expand with the application of heat; but in addition, the tube of the thermometer being a very fine one, the rise of the mercury is readily perceived in it by such a slight increase of heat as would never perceptibly affect the mercury in the bulb at the end. In this way we get what we want: an instrument that will plainly record for us a difference in the heat or temperature of the body,

which we could never recognise by our touch, much less express in definite terms.

But while we can see that it rises and falls, we must have numbers to indicate the extent to which this occurs, if we wish to have definite terms ; and we must have fixed numbers that will apply to all instruments, if we wish to have a uniform expression of a particular temperature. In our country the thermometer usually employed is known as Fahrenheit's, and it is so marked that the freezing point of water is thirty-two degrees (written 32°) and the boiling point 212°. By this scale the natural temperature of our body is about 98½°, or as it is usually expressed, 98 point 5 (written 98·5°), that is 98 and $\frac{5}{10}$. But each degree in the thermometer is usually divided into five parts or fifths ; so that suppose the mercury rises to the first of the smallest marks above the 100, it will indicate a temperature of 100 and $\frac{1}{5}$ or $\frac{2}{10}$, or, as we always read it, 100·2°. Again, the nurse will notice the arrow-head at one of the smaller marks above 98°. This she will read as 98·4°, which must be remembered as being the number that denotes the average natural temperature of the body—the *normal* temperature, as we say. The temperature of the human body in health varies somewhat in the twenty-four hours. It is rather higher in the afternoon than in the morning ; and in disease this difference is, as a rule, increased. For this reason the temperature is usually taken morning and evening, to see if besides, say, a general rise, there is any peculiarity in the relation between the two. Before the morning and evening meals are generally the most convenient times for taking the temperature ; but whatever be the time selected, it ought to be the same every day. Should the nurse be directed to take the temperature more frequently, she will be told, or should ask, which hours she is to select

We come now to the way of taking the temperature. It will not do to lay the thermometer on any exposed surface of the body; for that is more or less cooled by contact with the external air. We must select a closed cavity, or what can be made one, in which the thermometer may lie. Usually the closed armpit (the *axilla*) is chosen for that purpose. The patient being in bed and, if possible, on his back, the thermometer is taken by the stem, and the bulb placed fairly into the hollow of the armpit. The arm is then brought close to the side, so that the bulb and, say, the lower half of the instrument, are thereby held, and quite shut in, by the armpit; the forearm is now brought across the chest, and the whole side fixed in position by the patient grasping the elbow with the opposite hand. The length of time that the thermometer should be kept in the armpit will depend upon whether or not the instrument records rapidly. The doctor may use a "one-minute thermometer," but it will be safer for the nurse to allow at least eight minutes. And even that time may be insufficient unless the armpit has been previously prepared by being kept closed and covered from the air for some little time. If it has not, then obviously the armpit itself will take a certain time to rise to the temperature of a closed cavity of the body, and still a further time to raise the mercury to the proper height. In hospital, where the nurse may have many temperatures to take in the morning, time is of great value. Accordingly she adopts the following plan. At least fifteen minutes before beginning she will have all the patients in bed, arms by the sides, and the bedclothes carefully tucked in over the shoulders and round the neck. In this way she will have prepared, as we have said, the armpit, and the temperature can then be taken in much less time.

The only other precautions that need be added are, to

wipe the armpit dry should there be perspiration ; to see that no clothes come between the instrument and the patient's body ; and, in the case of children, or with very weak or delirious patients, to keep the thermometer and parts generally in the proper position. With the old form of thermometer, when the temperature was taken it had to be read from the stem while the bulb was in position, because in taking out the instrument the very much colder atmosphere caused the mercury to run quickly down. But now they are all what is called *self registering*, that is, when the mercury runs down, a small portion, separated from the main column by a little bell of air, remains fixed ; so that the temperature may not only be read on taking the instrument out, but at any time afterwards if left undisturbed.

Having read off the temperature so registered, the nurse will note it down on a special card or on a sheet of paper, with at least date and morning and evening temperature columns, the patient's name being written across the top. When she has done so, she must never forget to lower "the index," as the part of the mercury left at the top is called, for should the next be a lower temperature, the index will of course remain at the original height, and she will simply have the old record continued. The nurse, then, will always lower the index two or three degrees below the *normal* (or natural) temperature of the body. This may be done by taking the instrument in the hand, holding it by the upper half of the stem, bulb downwards, and shaking the index down by a succession of rapid swings of the arm downwards and backwards.

The meaning of certain temperatures, or series of temperatures, does not come within the nurse's province. Her duty is to note the temperature, which is a comparatively easy thing to do, not to interpret it, which may be an exceedingly difficult thing to do. She will soon,

however, get a notion of what a particular temperature may be said to represent in common terms; for example, that one of 100° Fah. is slight feverishness; that a temperature of 101° or 102° in the morning to 103° in the evening may be termed moderate fever, while above 103° morning and 104° evening is high fever, observing the while that the evening temperature to have a meaning corresponding to the morning temperature must be about a degree higher. There is just one important exception to the rule that the meaning of certain temperatures does not come within the nurse's province. She must know what is a *dangerously high temperature*; that is, a temperature which is dangerous because of its height alone, quite apart from the danger of the particular disease. Any temperature above 105° Fah. speedily becomes a danger in itself, and the doctor should be informed of the fact at once. It is spoken of as "an abnormally high temperature," or *hyperpyrexia.* The nurse's treatment of hyperpyrexia until the doctor comes will be found at page 49.

8. **The Pulse.** As the temperature of the body may be likened to the heat of the boiler, so the pulse may be said to represent the rate at which the engine is going. The pulse is the beat or impulse of the blood as driven by the heart's action against the walls of an artery; and we generally refer to the beat in what is known as the *radial artery*, as it passes over the front of the wrist immediately within its outer border. There is no such precise rate of pulse in health as is generally supposed. Seventy-two beats in the minute may be taken as an average rate, but it will vary greatly, not only according to the amount of exercise we are taking at the time, but according to whether we are lying, sitting, or in the erect posture. It is quicker after we have taken food; and during sleep it is slower and more regular than at any

other time. Suppose then, we count the healthy pulse in the evening, the person being at rest, we will find it beat about sixty in the minute, which is the rate of a pendulum ticking once in a second. But in the forenoon, while engaged at one's ordinary duties, it may be fifteen or twenty beats higher. It is quicker in children than in adults, in women than in men.

The nurse may with advantage endeavour to retain in her mind for purposes of comparison the beat or rate of a clock, ticking sixty in the minute, which is the beat of a rather slow pulse. Double that, and we have the rate of a very quick pulse, namely 120. But no one depends now on any natural power to estimate the rate of the pulse. It is always counted from a watch, and from one having a seconds-hand dial-plate. To count a pulse is not a difficult thing. The nurse will first find the artery as already stated, lying to the inside of the prominent tendon of the thumb, and placing two fingers upon it, she will get a general idea of its rhythm or beat. She will then look at the moment hand of her watch, and begin counting with the first beat of the pulse, *after the second hand has passed*, say, the number 60, and continue counting *till the instant it has again arrived at that point.* If she is careful to do this exactly, and count during a complete minute, she will be able as a rule to take a pulse with accuracy. So much for the rate of the pulse; the quality of a pulse, for example is it weak or strong, is a very different thing, and hardly comes within the nurse's province.

9. **The Breathing.** The rate of breathing also may require to be taken from time to time. In proceeding to do this one must always remember that the movement of breathing or respiration is, unlike the pulse, partly under the control of the will. Whenever we think of our breathing we more or less influence its movement. To

be quite natural it must be unconscious breathing. The nurse must therefore endeavour always to count the respirations unobserved. This can be done the more readily that it can be done by sight alone. In the male respiration is chiefly abdominal, or more correctly, diaphragmatic, that is, effected by the rise and fall of the diaphragm. In this way there is a movement carried to the abdominal wall by which we can easily observe and accurately count the number of respirations. In the female it is chiefly costal, that is, effected by the rise and fall of the ribs. We can easily therefore count the respirations by sight alone, and when the patient thinks we are doing something else; for example, continuing to count his pulse. And so the respiration should, if possible, be counted during sleep, when it is always slowest and most regular. In any case, let the patient be lying still and undisturbed. In health the rate of respiration varies from 12 to 18 or 20 in the minute, being higher in women and children.

Then there is the character of the respiration. It may be frequent or slow, easy or laborious. It may be slow and yet laborious, as in severe chronic bronchitis. It may be rapid and not laborious, as in acute inflammation of the lungs. It may be frequent and shallow from the pain which it occasions, as in certain diseases of both chest and abdomen. Any occurrence of this kind should be carefully noted; so also any obstruction to the breathing about the throat, indicated by a peculiar harsh, blowing sound, which conveys to one's mind, without any description, its true cause.

10. **The Excretions.** By that is meant what is passed from the bowels—the motions or stools, and what is passed from the bladder—the urine or simply the water. The nurse will note when the bowels are moved, whether they are moved naturally or as the result of a purgative,

and whether there is pain before, during, or after movement. In certain diseases, as we shall see later, the colour and consistence of the motion would call for remark, and in any case the presence of blood or worms would always require to be reported. And similarly the general appearance and amount roughly of the urine, as well as the frequency with which it is passed, or any difficulty or pain in passing it, would not be overlooked, so that the nurse would be prepared to report anything unusual in these respects.

The calls of nature themselves demand instant attention. In some diseases they are frequent; in other diseases they are urgent and sudden. Bodily weakness, with its accompanying dulling of the senses, often leads to those calls being but little heeded by the patient; and in states of unconsciousness or *coma* they are altogether disregarded. In certain forms of paralysis, what is expressed as *loss of control over bladder and bowel* is a common symptom, when, especially as regards the inability of the bladder to retain its contents, the nurse's ingenuity will be greatly taxed to keep the patient dry. If this cannot be effected by the use of the urine-bottle or slipper, some special precautions under the doctor's guidance will be required. This special care applies quite as much to the opposite condition, known as *retention of the urine.* The nurse would instantly report any suspicion of this inability. In the case of the bowels there is not the same difficulty. The bed-pan should be warmed with hot water before being used, and the patient gently raised on to it—with the help of an assistant if the patient is very weak. All such utensils should be kept scrupulously clean, in the bath-room or other adjoining room.

CHAPTER III.

Management of Patient—Washing and Dressing Patient—Lifting Helpless Patient—Invalid Diet: Its Nature—Preparation—and Administration.

We have considered in the previous chapter the chief points in the patient's condition which the nurse should take note of, and more especially the possible changes in that condition which it would be necessary for her to report to the doctor, or even, in some cases, warrant her to take action upon herself. We now pass to the nurse's management of the patient in ordinary, and also in some exceptional circumstances.

A great deal has been said and written in recent times about the qualifications required of a nurse for the proper performance of her work; and we are all quite agreed now that patience, gentleness, discretion and tact are excellent things in nurses, as in all women. But in the management of the patient there remain one or two points that will bear repetition. First of all, avoid that incessant fidgeting of the patient that everyone understands as "fussiness." No one likes to be bored, least of all a patient. He expects to be attended to, but not to be worried. It is a mistaken kindness that the too anxious learner can with a little thought guard against. One must, on the other hand, avoid the attempt to be absolutely noiseless in a sick-room. The patient wants

a quiet, but still a real presence about him ; not a ghost. Indeed the rule about speaking softly but not whispering illustrates one's whole duty in this respect.

There is this further point that requires some experience before it can be acted upon on the nurse's own responsibility. Her management of the case may, and often will, have to depend upon her opinion, or upon the opinion that has been formed for her, of the patient himself. She may in one case require to maintain from first to last a very conscious exercise of patience and forbearance, and in another a degree of resolute firmness that is positively irksome to her. The doctor will be her guide in these exceptional cases.

Washing and Dressing Patient. Here we are reminded of the common difficulty in disease that where a thing is most needed it may be worst borne. The sick man particularly needs his skin to be kept clean ; for to the skin is sent much of the waste and poison that the diseased body endeavours to throw off. But the more he is sick, the less will he bear to be disturbed. That is the difficulty that faces the nurse here ; and the difficulty will suggest to her in a general way how she should proceed. She will move the patient as little as possible, and she will protect him from cold or chill by having the room at a temperature of between 65° and 70° Fah., while a screen is also put round the patient to protect him from draught. To save time she will, before beginning, see that she has all that is needed ready to hand ; and with a warmed towel she will keep the patient's night-dress and bed-clothes from getting wet.

As a rule the patient should be washed before breakfast. If he is very weak the face and hands at least can be cleansed, using soap and warm water and a soft piece of flannel, which best retains the heat. If a more thorough wash can be borne, it had better be done after

breakfast, when the patient has rested for at least an hour. If the whole body is to be gone over, begin with the trunk, then the arms, and finally one leg after the other. To take off the shirt in bed, raise the patient a little, let the arm admitting of most movement be held backwards and the sleeve drawn from it; then carefully draw the shirt over the head and towards the affected side, if any, as it is being removed. The clean shirt will be put on in the reverse order. It is always desirable to have two sets of under-linen in use, and it is quite necessary to have this if the patient perspires much. In such a case if the air reaches the damp clothing, cold is at once felt. It must then be replaced by dry and warm clothing, and the damp clothing thoroughly dried before being used again.

The mild stimulus of washing partly explains its refreshing effect on the patient, and to this is also due the relief that is often afforded by having the hair well brushed, if the patient is strong enough to bear it. He will also find it pleasant, as it is always cleansing, to wash out his mouth with a little water in which a pinch of borax has been dissolved; and if he is too weak to give the usual attention to his teeth, the nurse must undertake this duty for him. A soft tooth-brush and the borax solution will suffice for this purpose.

Lifting the Helpless Patient. This may be necessary in order to place the patient on another bed; or to get the bed in use thoroughly re-made. It is a thing that the untrained are apt to do badly: it can be well done with a little instruction and practice. The whole thing will be a comparatively easy matter if the patient happens to be lying on a bed which is not too wide, and the room admits of a similar bed being placed end to end with the one occupied. Two persons, or four (two on each side) if the patient's weight and helplessness require the greater number, will now grip the under-sheet, when the

patient can be readily lifted on to the other bed. If a still less degree of movement of the patient is demanded, a firmer support can be had by rolling the under-sheet tightly round two long poles or brush handles so as to form an improvised stretcher.

If from want of room the beds cannot be placed end to end, then they should be side by side, with a sufficient space between, and having the head of the second bed at the foot of the first. This last is quite an essential point in the method now to be described. If the patient is young or not too heavy there is no better method than simply for the nurse to lift him in her arms. But she must know how to do this. Having drawn the night-dress well down she will pass one arm under the patient's thighs and the other under the middle of his back, while she directs him to put his arms round her neck and keep his legs loosely hanging. Her movements must be gentle, yet steady and without hesitation, or the patient will be afraid. And that is just what comes with practice alone.

Invalid Diet: its Nature, Preparation, and Administration. We have had occasion already to speak of disease as a conflict; and if we think of it in that light once more in considering the question of the patient's diet, we shall have a key to the right understanding of that important subject. If in health we need food from time to time to keep up the natural heat and energy of the body, and make good the loss continually going on from ordinary wear and tear, we can see how much more we need it when we are ill, when all the wear and tear of battle and the heat of strife are draining the strength away. But that is not all. Just as in the ordinary conflict the soldier must think of nothing else, so in the conflict with disease all the energies of the system are directed to driving it from the body. In other words, when food is most needed, the system fighting with

disease has least time to take it. That is certainly so if the disease is acute. The struggle must go on, right on it may be, night and day. If the disease be chronic, or even after the turn in acute disease, the system may be so exhausted that the food taken cannot be absorbed, or *assimilated*, as we say. By that we mean that the patient cannot make the food a part of himself, and so renew the strength which he has lost. These considerations help us to understand the difficulties that lie at the very foundation of invalid feeding.

That we may understand how these difficulties are to be met and overcome, we must know something of the process of digestion. That is the process by which the food is converted into a state in which it is fitted to be taken up or assimilated by the system. This is begun immediately on the food being taken into the mouth: there it is (1) broken up by the teeth, and (2) reduced to a soft pulp by the saliva, as mere water cannot possibly do, so as to make it easily swallowed. Besides this, what are known as the starchy constituents of the food, of which a great part of bread consists, are acted on chemically by the saliva.

When the food reaches the stomach it comes under the influence of the *gastric juice*, which acts mainly on what are known as the albuminous constituents, of which the lean of meat is a typical example. The gastric juice is poured out on all sides by the walls of the stomach, and thus the portions of food lying next to the walls are acted upon first. But now a curious muscular movement of the stomach commences, by which these portions of the food first digested are thrown inwards, while fresh portions are thereby brought into contact with the walls, to be again driven inwards and replaced by less digested parts.

Another remarkable power which the stomach has is

that of moving or sending on parts of the food as soon as they become sufficiently digested, and retaining the rest —a process of selection as essential as it is wonderful, because some portions of our food are digested much more slowly than others.

The fatty ingredients of our food are not, properly speaking, digested in the stomach. They merely undergo a mechanical division into much smaller particles, and are then carried into the first or highest part of the small intestine, where their digestion really takes place through the action of the secretions from the liver and pancreas.

Fluids are directly absorbed by the stomach. Vegetable food is, as a rule, difficult of digestion. The cell-walls of the coarser vegetables may resist digestion altogether.

From this mere outline of the process of digestion we may learn some important lessons. These lessons we shall take in the same order.

First, then, the nurse must not forget the important part that chewing, or *mastication*, fulfils. If imperfectly performed, it may itself lead to indigestion. Should it result from carelessness, the nurse may advise the patient accordingly ; if from the defects of old age, then the toothless gums must be aided by the administration of softer and pulpier food. But whether the food can be well chewed or not, time should be given to admit of it being acted upon by the saliva, particularly in the case of vegetable products, which consist largely of starchy principles. The nurse will see, therefore, that if the invalid will soften his bread in his beef tea or chicken soup, he ought to roll the soft morsel a little in his mouth, and not bolt it because it is soft. He had much better take the bread separately, hard as it is.

The muscular movement of the stomach walls, which the presence of food occasions, must always be taken into account in any structural disease of that organ. And so

in a case of ulcer of the stomach the nurse will be directed by the doctor to give food, not only which is very light and digestible, but also in very small quantities at a time; for in that way less movement, less disturbance, is set up.

To come now to the next steps in the process of digestion already noticed. In giving food often we must avoid the danger of giving it too often, which we may readily do if the quantity is not very small, and the food of the lightest character. We may give food before the last meal is digested, imposing needlessly on the stomach the exercise of that power of selection to which we referred. Even in a healthy person this may cause indigestion.

As to the digestion of fatty principles, the nurse should always, unless specially directed otherwise, give cod-liver oil immediately *after* food. It is certainly more easily borne by the stomach then, probably because it undergoes the necessary mechanical subdivision more thoroughly with the rest of the food, after which it becomes naturally acted on by the secretions from the liver and pancreas.

The last point, the comparative indigestibility of the stronger vegetables, is an important one in itself for the nurse to know; and it will suggest the question, What vegetables, if any, may be given to the invalid? and even the further question, What food generally is most suitable for the invalid? This we are now going to consider.

In any form of disease which has induced general debility the stomach is necessarily involved as well. It loses its *tone*, as we say. In such cases we require to begin with light food; sometimes the very lightest we can think of. Beginning, then, with the lightest articles of diet we mention first, whey, milk and soda water, and milk alone. Whey is what is left from milk when all the *casein*, the albuminous principle, is separated from it as

curds. It is lighter, but of course much less nutritious than milk. Milk and soda water is lighter than milk in proportion to the amount of the water added, and is so much the less nutritious. Two parts of milk and one part of soda water is a usual proportion. If soda water is not to be had, about 10 grains of bicarbonate of soda (baking soda) dissolved in as much water as one would add to a pint of milk is a good substitute. Milk itself comes next.

Such forms of food the nurse will often be directed to give; but besides that she will often be told probably to give them in small quantities at a time. She may find it necessary to give only a dessert-spoonful, say of milk and soda water, every quarter of an hour, and even that the stomach may not retain. In such circumstances the patient must be kept still, with the head rather low; and the nurse may add a little ice to the milk, or place a small piece in the patient's mouth. Such plans as these she may have to adopt on her own responsibility till the arrival of the doctor. Once the stomach's scruples are overcome, the amount given at a time may be cautiously increased, and the proportion of soda water in the milk lessened.

From this the patient may pass to chicken soup or beef tea, with which perhaps a little *toasted* bread or water-biscuit is given, taking the precaution as to amount already referred to. Chicken soup is often preferred when cooled to a jelly, and of this a teaspoonful at a time may be enough. Beef tea or a little essence of beef may sometimes be given; *iced* in some cases with advantage. Of the two, chicken soup is the lighter, and generally the more palatable.

The next stage, as we may call it, includes chicken, sweetbread, or the more homely dish of tripe, if the patient can take it; boiled white fish, such as whiting,

haddock, sole, etc., and any light farinaceous pudding or custard. When the patient can take these dishes it is time to think what vegetables may be added. Cauliflower is probably the lightest, but asparagus, spinach, green peas, and generally the more tender vegetables may be tried

We come next to ordinary diet. Here we need only say that mutton (boiled) is the lightest form of butcher meat. Lastly, there is what should be avoided by the dyspeptic patient. There is no precise rule in this respect, but the following may be set down as objectionable: highly seasoned food, salted meats, pork, game, pastry, cheese, nuts, shell fish, and all raw fruits, except grapes, oranges, and strawberries.

The Preparation or Cooking of Food. Of the different methods of cooking it is generally considered that boiling is the lightest and simplest, and it is the most economical. Water being the medium in which the food is cooked, the heat is never so excessive as to cause it in that way to be overdone; nor will the water itself, as a medium, lead to those chemical changes which occur so readily in some other forms of cooking, rendering the food quite unsuitable for the ordinary patient. In cooking meat in this way, it should be put first into boiling water—a temperature of 212° Fah. The object of this is that the boiling water may coagulate the albumen on the surface of the meat, and so close up the pores there that the juices of the meat cannot escape. Having done so, the pot should be set a little to one side of the fire so that the temperature of the water may fall considerably below the boiling point. If, on the other hand, beef tea or soup is to be made, the meat is cut into small pieces, and placed in cold water, after which the temperature is gradually raised.

Broiling (or brandering) is probably as light a method

of cooking, but it is not so easy to do it well. The risk of overdoing it and so impairing the nutritive qualities of the food is greater. To do it properly, one requires a clear, uniform charcoal fire, and the gridiron itself should be heated first, the object being to coagulate as quickly as possible all the albumen on the surface of the meat. It should always be done *over* the fire and not *in front* of it, for by the latter method the draught coming towards the fire will necessarily cool one side of the meat. Roasting comes next in order of lightness, but of that method of cooking nothing need be said.

For invalids, stewing, baking and frying are most objectionable methods of cooking. The last particularly, on account of the fatty acids that are formed in the process.

With regard to the cooking of vegetables, any means employed by which their colour is preserved, whatever these means be, render them so much the less digestible. The colouring matter itself is said to resist digestion greatly, and its preservation probably indicates that the walls of the starch cells are not burst in the process of cooking, as they ought to be, and their contents not acted on so as to render them more digestible, as proper cooking always does. The stronger vegetables, such as cabbage, greens, carrots, etc., if given at all, cannot be boiled too long.

The Administration of Food. This comes peculiarly within the nurse's province, and is a matter of the first importance. The diet may be wisely laid down, the food well cooked, and yet the neglect of some apparently little detail in the way in which it is presented to the patient may undo all that has preceded. Hence the rule that whatever food is going to be given to a patient should be made as inviting as possible. For this object there is surely nothing so imperatively necessary as that every-

thing should be scrupulously clean. The nurse will see therefore that the feeding cup and all vessels used for food or medicine are kept so. It is a good plan to have a second feeding cup, which is to be used only for giving medicines. A bent glass tube will be found very useful. It has been often remarked that a patient will take a little fluid nourishment through the tube when he will not have the feeding cup. Probably the fact that he can see what he is doing in the one case and not in the other makes all the difference. After use the tube should be held under the tap in order to be thoroughly washed out. It should then be kept lying in fresh water.

There are one or two little matters that it may be necessary in some cases to attend to before the patient can be induced to take his food. If there is great weakness, and particularly if it is a case of fever, the tongue is likely to be foul and dry, and the mouth and teeth coated with an offensive deposit called *sordes*, which forms as a result of disordered secretion and mouth breathing. This can be removed by the use of the tooth-brush and a mouth wash of the borax solution already referred to. Besides this, it is well to wet the lips and tongue of a fevered patient frequently with simple water perhaps, or some acid solution such as lime juice and water. A small piece of ice in the mouth occasionally is always grateful and always safe. If the patient is so weak as this, it is well in giving him food to raise his head a little by raising the pillow under his head. But if his head be raised too much it will increase any difficulty he may have in swallowing.

If the patient is in a state of semi-delirium or coma, an attempt should be made to rouse him somewhat before giving him his food. Sometimes merely putting the spoon to his mouth is enough; at other times the nurse will require to get it well to the back of the tongue. In

such cases she will watch carefully to see that the liquid is swallowed before attempting to give a second spoonful. It may sometimes be difficult to know whether or not a patient should be roused in this way to take food, because he may be sleeping naturally. If in any special case the nurse should feel a difficulty in this respect, she must ask for special instructions. It is, however, accepted as a sound general rule that, if a patient is sleeping naturally, he is not to be awakened for either food or stimulants.

There are a few general principles regarding the administration of food in cases of pronounced weakness which it is important for the nurse to know. We have always found that any one of much experience in the care of the sick, or who has passed through a severe or prolonged illness herself, has thoroughly endorsed Miss Nightingale's remark that in such circumstances *the patient should never be asked beforehand what he will have.*[1] Let some suitable article of diet be prepared as best the nurse can, and set it before the patient in as attractive a way as possible. Let him have quietness when at meals; as a rule he is better to be alone. It is well, if possible, that he should see no food but his own.

The patient should not be given more at one time than he is likely to be able to finish. A large quantity suggests defeat before the attack has begun. Should anything be left, do not let it remain by his side. All food should be out of sight, and out of smell, too, if possible, when it is being cooked. Of course, these rules cannot be always closely followed, but every endeavour should be made to follow them as closely as possible.

Then there is the necessity of punctuality in the

[1] This, of course, only applies to actual illness, in which the appetite is capricious, or, it may be, quite gone. It is altogether different when recovery has begun: then the patient takes a practical interest in his meals.

serving of meals. A person in health generally expects punctuality in that respect, in whatever else he may be remiss: in disease the nurse must be punctual for him. But even in disease there may be one particular hour at which the patient feels he could relish a little food. That opportunity must never be allowed to escape. Let the same hour be kept to every day, or judiciously train the patient, should that be necessary, to keep to it.

Lastly, the nurse must acquire the habit of observing, with the same exactness, how much the patient has taken. In no case are vague statements of any use. In most cases the precise quantity given ought to be noted just as carefully as the amount of medicine or stimulants which has been administered.

CHAPTER IV.

Cough—Spit—Spitting of Blood—Prevention and Treatment of Bedsores—The Administration of Internal Remedies—External Remedies—Baths—Tepid Sponging—The Cold Pack and the Ice Pack—The Cold Bath—Cold Affusion.

THERE are three symptoms of disease still to be considered, all of which the nurse may have the first opportunity of observing, and which she must, therefore, know how to report upon. These are cough, spit, and spitting of blood. They are commonly, but not necessarily, due to some disorder of the respiratory system.

Cough. A cough is a sudden expiration forced through the upper end of the windpipe from a sense of something to be dislodged there. It may only be a sense of something, or there may really be something. This fact affords a convenient and common division of coughs into *dry* and *moist*.

1. *A dry cough.* This is the form which is often called a hard cough, and sometimes a tickling cough. There is nothing about the windpipe to be brought up; the irritation is in the nerves of the part, and may be brought to them from the most distant part of the lungs, or even beyond them. The cough must, therefore, be carefully noted whatever disease the patient is supposed to suffer from.

2. *A moist cough.* Often termed a soft cough. It is a

cough with spit or *expectoration*; the object being to expel the undue secretion from the windpipe or from the bronchial tubes.

Does the patient get this secretion readily up, or the contrary? Is the cough severe; or, if not, is it frequent or "troublesome"? Is it worse during the day or during the night, or at any special time? Does it come in fits or paroxysms, as in whooping-cough? In this disease there is, of course, the characteristic crowing noise or whoop, which gives the disease its name. Anything like that, or any peculiarity in the sound of the cough must be reported.

The Spit or Expectoration: the *sputum* (pl. *Sputa*). It is the undue amount of secretion or defluction discharged from the air-tubes. It varies much in character, as well as in amount, and should always be kept for the doctor's inspection. This is usually done by collecting it in an earthenware spittoon, into which a little water may first be put, unless the doctor directs otherwise. In certain cases some disinfectant may be put into the spittoon, but to this we shall refer later. Three varieties of spit are recognised.

1. *Mucous spit.* It consists almost entirely of mucus, and is fluid, clear and transparent, with few air-bells. It indicates the least departure from health.

2. *Muco-purulent spit.* As its name implies, it combines the characters of the mucous spit and of the next variety, the purulent. It is frothy, owing to the mucous portion being intimately mixed with air; the purulent and heavier portion falls towards the bottom of the dish. It is the most common variety.

3. *Purulent spit.* This is all, or in great part, pure "matter" or pus. It indicates an advanced or chronic stage of disease, though the particular disease may be comparatively trifling

Spitting of Blood. Blood brought up in any form must never be overlooked. It may appear in the spit as spots or streaks ; or it may be so intimately mixed with the spit as to lose its characteristic colour, and give to the expectoration generally a brownish or rusty tinge.

It may be coughed or brought up alone as pure blood. If it comes from the chest it is usually coughed up, and is of a bright red colour, fluid and frothy. This form is called *hæmóptysis.* If the blood comes from the stomach it will be darker and not frothy, possibly with some clots and mixed with food. If it has been lying for a time in the stomach it may closely resemble coffee grounds. This form of hæmorrhage is called *hæmatémesis.* Either form of bleeding, if alarming, must be treated by the nurse by applying a folded towel, wrung out of ice-cold water, to the chest or the pit of the stomach. When it is checked the patient must be kept quiet and lying low, and medical assistance should be obtained as soon as possible.

The Prevention and Treatment of Bedsores. It would seem as if the diseases of each particular *system*, as we say, had some outstanding feature which calls for the nurse's special attention. We have just been considering symptoms that have a special relation to the respiratory system, and now we pass to the consideration of what is usually a sign of pronounced paralysis, which is a disorder of the nervous system.

In health we are continually changing our position. Even in sleep we do so more or less though all unconscious of the movement. But in paralysis proper, or where acute or advanced disease has paralysed the senses, the patient may lie so long in one position that the points of pressure of the body become actually worn through, and may even die. That is just a bedsore ; and a bad one it is when not only the skin but a piece of deeper tissue

actually dies or sloughs. Undue continuous pressure will at length cause any part of the body thus to give way, even in a healthy person; how much more readily will this occur in conditions of bodily weakness. And the weaker the patient the more helpless does he lie in bed, so that the liability to bedsores increases twofold. Now it is the recognised duty of the nurse to prevent them forming if it is at all possible; and as to the possibility there is a general agreement that *a good nurse will prevent the formation of a bedsore in nine cases out of ten in which a careless nurse will not.* If such be the case, the nurse's care and skill will be frequently put to the test in a very definite and unmistakable manner.

A case of pronounced paralysis is most likely to be the tenth case that will baffle all the nurse's skill and ingenuity, especially if there be in addition to the general weakness a special weakness or paralysis of nutrition in the part on which the pressure mainly is. In these circumstances bedsores will readily form on any prominent part; the commonest situations being over the lower part of the back, and at the projections over each hip joint. There are, undoubtedly, some cases in which bedsores cannot be prevented, cases in which the ordinary pressure on the elbow or heel will cause their formation there; but these must be viewed as very exceptional.

The nurse will therefore aim at the *prevention* of a bedsore. She must not wait till the patient complains. She will not only look for, but endeavour to forestall the first appearance of weakness of the skin. And what is the first sign of this? It is usually one of these two. Either the patient complains of some itching or irritation about the part, perhaps imagining that the sheet is ruffled when it is really quite smooth, or else there is a little blush of redness on the skin over a prominence. This

redness the nurse will be expected to have discovered for herself. If the sensibility of the skin be unimpaired the patient may be the first to draw attention to it; but he should not be, at least in any case where there is a possibility of such a thing occurring. Any illness accompanied by weakness or emaciation, particularly if the patient can lie only in one or two positions, or still more the fact of there being any loss of control over the bladder and bowel, should at once suggest to the nurse the liability to bedsores. She will therefore examine carefully from time to time the parts most liable to pressure, namely, the lower part of the back and the prominences of the hips, and also the elbows and heels.

If the first symptoms are neglected, the part becomes swollen or puffy, the redness gradually assumes a darker or bluish hue, and a slough at length forms and separates, leaving an unsightly surface, and revealing probably a much greater loss of tissue than was suspected. Now to prevent all this the nurse must attend to the following points.

Keep the sheet on which the patient is lying smooth and tight and dry; if a draw-sheet is used tuck it firmly in at the sides of the bed to ensure this. See that no bread crumbs, for example, or any similar cause of irritation be allowed about the sheets, and change the patient's position in bed as often as other circumstances will permit.

Then with regard to the skin itself, wash the parts carefully with soap and water at least night and morning, and be most particular in drying them thoroughly afterwards with a soft towel. This not merely ensures cleanliness and the removal of the natural exudation on the surface of the skin, which cannot in the circumstances readily escape, but positively strengthens and hardens the skin. This last effect is further increased by rubbing

the skin with some form of spirit, *e.g.* rectified spirit, which has the least smell, eau-de-cologne, brandy, etc., or with an astringent lotion, such as a saturated solution of alum. The earlier such treatment is begun the better. In a case of paralysis it should always be begun before there is any appearance of redness. Should the redness appear to be spreading or deepening, or in any circumstances should the case likely be prolonged, a water-bed becomes essential. This distributes and so far equalises the pressure over the whole body, and is therefore preferable as a rule to the circular or horseshoe air-pillow or water-cushion which only shifts the pressure to neighbouring parts. That will not suffice in severe cases; and in cases less urgent the pressure can generally be relieved by varying the patient's position in bed.

If in spite of all precautions a bedsore forms, all the above applications must be stopped and the sore treated as an ordinary ulcer. If simple water-dressing or carbolised oil be applied, the nurse must see that no part of the lint becomes uncovered by the gutta-percha tissue which has been placed over it, or it will soon become perfectly dry and adherent to the ulcer. It is not always easy to apply the dressing in such a way that this may not occur from the movements of the patient. In these circumstances it is a good plan to try an ounce of zinc ointment, to which half an ounce of glycerine has been added; for this, if spread on lint, will keep moist for a considerable time without gutta-percha tissue over the lint.

In changing any of these dressings, the ulcer should be gently washed, and in the case of a zinc ointment application, a little simple or carbolised oil will be required occasionally to clear away some of the zinc powder, which is always apt to dry in.

The Administration of Remedies. This is what is popularly understood as the treatment. But it is only a part of it. The whole care of the patient is his treatment or cure; for care and cure have originally the same meaning. And of all this care of the sick, which is the nurse's constant and immediate duty, there is no part of it that must be more entirely under the doctor's directions than this administration of medicine. It is this part of the treatment that, being least understood, is most easily undone by the interference of another, whether that other be some sympathising neighbour or the nurse herself.

There is first of all the quantity or dose of the medicine to be given. Unfortunately, the common system of ordering fluid quantities is both inaccurate and misleading. By a table-spoonful for a dose was originally meant half-an-ounce fluid measure. But the difference of opinion as to when a table-spoon is full may represent fifty or a hundred drops, and after all table-spoons are of very different sizes. The modern table, dessert and tea-spoons hold about twice the quantity that their old-fashioned namesakes do, and it is the latter that are meant by the prescriber. And so if the dose is "a table-spoonful three times a day," it is the old table-spoon that is meant—really only a dessert-spoonful of the present day. In the same way if a tea-spoonful were the dose it would be the old tea-spoon that was meant, which is just half the size of the modern one. Nor is it more accurate to say so many drops. Drops differ in size according to the consistency of the fluid, the shape of the lip of the bottle, and other conditions. It is therefore much better, much safer to use, for the larger doses, a small tumbler on the side of which the standard measures are marked; and for the drop doses a still smaller glass measure with the number of minims (roughly the number of drops)

similarly marked on the side. (See the table of Fluid Measures at p. 151, which should be committed to memory.)

Then there is the time when the medicine is to be given. It may be the first thing that is to be given in the morning or the last thing at night; but usually the time of administration has a definite relation to meals—so long before or so long after. But it may be that the directions are only so many times a day, or every two, three or four hours as the case may be. It is well then that the nurse should have some scheme drawn up for her guidance. For example, suppose a medicine is ordered to be given every four hours, night and day, she could arrange the hours thus—2, 6, 10 a.m., and 2, 6, 10 p.m. If four times a day she could say 8 a.m., and 12 noon, and 4 and 8 p.m.; or three times a day—9 a.m., 2 p.m., and bedtime. The patient's meals, as has been said, often determine when medicine is to be given. Stomach tonics are usually given before meals. Blood tonics, as they are called, are usually given during digestion; and so also some medicines which are not easily borne by the stomach except after food, for example, arsenic, and in many cases, iron.

But what if the medicine is forgotten to be given. The patient is not likely to be so solicitous about this as about his food. Some day it is forgotten, and very probably it occurs to the nurse that she will just double the dose next time. There could be no greater mistake. She only adds to her error. She may do her patient an injury; she is certainly doing herself an injury by agreeing to her own carelessness. It is to avoid these risks, and to insure accuracy as to all similar details, that the note-book or the nursing chart is in such general use at the present day.

It need hardly be said that a nurse should never

administer any medicine on her own responsibility, except in an emergency. She may not do much or any harm by merely giving a simple purgative, but why should she assume a serious responsibility by doing what is clearly the duty of another. Here are some short rules for her guidance.

Never give any part of a mixture without first looking at the label. The nurse should be careful to teach herself this habit: it may prevent many a serious error.

It will do no harm to acquire the habit of giving all mixtures a slight shake before using them, and when pouring them out to keep the labelled side of the bottle up, which will prevent the directions from being blotted with drops of the mixture.

Medicine is usually given in a little water. If not so stated in the directions, it will generally be safer to give it in water to begin with, and ask for further instructions.

Never allow a bottle to stand uncorked. Volatile mixtures will quickly lose their strength; and others, by the evaporation of the water in them, will actually in a given quantity become stronger. Some should not be exposed to light; for example, chloroform, nitrate of silver solution, etc.

Many medicines are difficult to take from their nauseous taste, and some from the form in which they are administered. Pills, for example, are often swallowed with difficulty. If so, they may be put into a small piece of bread and then taken with a little milk or water. Powders, if they are not large, may be taken within thin pieces of bread. If the powder is to be mixed with water or milk, see that this is done thoroughly. A light and and only partially mixed powder may produce not only a disagreeable, but a suffocating effect on a young child's throat. The common grey powder is better given in

milk or gruel than in jelly. As for castor oil, everybody has at least one nice way of taking it, by which it is rendered quite tasteless. Try this way. Adopt, say, the common method of putting half-a-teaspoonful of brandy into a table-spoon and filling it up with castor oil; then—let it go well over the back of the tongue, avoiding the front half altogether, and no taste will be felt.

One word as to the administration of a narcotic. If such a drug does not procure sleep as it is intended to do, it will often only excite. Now the tendency to sleep may be thwarted, in place of being encouraged, by injudicious management. If a soothing draught is directed to be given, say at bedtime, then any talking that may be necessary should be got over just before that time, and if other things admit of it the patient should be placed in a new and comfortable position. The draught should then be given, the gas lowered, and the room kept perfectly still. In some such way will the patient be most likely to obtain a refreshing sleep.

Baths. We need only here consider the different kinds of water-baths as external remedies. For practical purposes they may be classed as hot or warm baths, and as tepid or cold.

Hot or warm baths are generally employed to promote the action of the skin, induce perspiration, relieve pain, or remove the congestion of some other part of the body. In the case of a child suffering from one of the eruptive fevers, a hoth bath is sometimes employed to bring out the rash more perfectly. Sometimes by its stimulating action on the skin and sometimes undoubtedly by its cleansing action, it soothes the child and perhaps brings to it refreshing sleep.

In preparing a bath we have to consider with some accuracy the degree of temperature wanted; and the

following table indicates the temperature which the different terms respectively may be held to represent:

Tepid bath, . . .	85° to 90° Fah.
Warm bath, ...	90° to 98° „
Hot bath, ...	98° to 112° „

The temperature of a hot bath, it will be observed, is from that of the normal temperature of the body upwards to one of most exceptionally high fever, and that of a warm bath, from the normal temperature of the body downwards a few degrees. One need hardly burden the memory with what is understood to be the temperature of a temperate and a cool bath: in special cases the nurse would have a bath thermometer on which all these terms mentioned have a definite temperature assigned to them. To prepare a bath put in the hot water first, and add the cold till the thermometer indicates the required temperature. But this process must be reversed in preparing an ordinary warm bath for a child. Many an infant has been scalded through neglect of this precaution.

The patient in most cases will be able to take his hot bath himself. He should not have far to go, and should avoid all risk of a chill by having a blanket or similar covering carefully round him and slippers on his feet. The nurse should be within call.

The length of time the patient should remain in the bath depends on his strength and the temperature of the water. A hot bath is always agreeable and even exhilarating for a few minutes, but if continued unduly, it becomes powerfully depressing even in the case of the strongest persons. Ten minutes is an ordinary time for an adult to remain in a hot bath, and fifteen in a warm bath. Immediately the bath is over, the body should be quickly dried with a soft towel, or a warm sheet may be

placed round the patient and the body dried through it. Let the patient then get to bed at once.

A *Foot-Bath* or a *Hip-Bath* should always be a hot one, and may be continued for fifteen minutes. A foot-bath especially, given most commonly to relieve cold in the head, should have hot water added almost continuously, a greater degree of heat being bearable as the temperature of the feet themselves is raised. A table-spoonful of mustard may be added in such cases with advantage.

In the case of an adult who is unable to leave his bed, a blanket-bath may be administered to induce sweating. A waterproof and blanket are first put under the patient; a blanket is then wrung out of hot water and wrapped around him. Over this three or four dry blankets are placed, and the patient lies enveloped in these for about half an hour. The surface of the body should then be rubbed dry with warm towels.

Turning now to the application of water at a temperature quite below that of the normal heat of the body, the nurse will most profitably consider this as a means of reducing high temperatures, in other words, as the treatment of *hyperpyrexia*. We have already said that this is always an alarming condition in itself, and while the nurse is awaiting the arrival of the doctor she will be anxiously considering what she may venture to do on her own responsibility.

Tepid Sponging of the forehead, neck, and arms will always be agreeable to a fevered patient, but will have little effect in reducing temperature. Should the nurse be confronted with an undoubted temperature of, say, 106° Fah., she would be warranted in sponging the whole body of the patient with tepid water.

A mackintosh with a blanket over it is placed on the bed, and on this the patient will lie with another blanket over him. The trunk and limbs can then be sponged

with vinegar and water, the process being continued for from five to fifteen minutes, and the part of the body varied as each part cools down. With some experience, and in a severe case, the nurse will fearlessly and justifiably use cold in place of tepid water.

The Cold Pack and the **Ice Pack** are stronger measures. The patient lying on a mattress, on which have been placed two blankets, should have a pillow for his head, and nothing covering him save one blanket. Cloths wrung out of cold water, or iced water as the case may be, are then slipped under the blanket and applied to the trunk and limbs, the cloths being repeatedly changed till the temperature is reduced.

The Cold Bath. In the most severe cases of hyperpyrexia the nurse must at least be ready to assist in carrying out this treatment by the doctor's orders and under his supervision. The patient is put into a warm bath, and whilst an assistant keeps gently rubbing the skin of the trunk and extremities with the palms of the hands, cold water is poured very slowly into the bath (which is best done by a tube led deep under the water) till the temperature of the bath is, after ten or fifteen minutes, lowered to 65° or 70° Fah. Some such method as this would be adopted, and the nurse should be familiar with the general procedure in these dangerous emergencies.

Cold Affusion. This is a common treatment of severe and persistent headache in cases of fever. It is usually done by supporting the patient's head over the side of the bed, and from a height of two, or perhaps three, feet pouring cold water upon it, the water being caught in a basin held underneath. The stream should be directed on the spot where the pain is most severe, or otherwise on the brow; generally the patient will prefer to have the water poured on a particular spot. It may be continued for a few minutes and repeated frequently.

CHAPTER V.

External Remedies: Fomentations—Poultices—A Mustard Plaster—A Fly Blister—Dry Heat—Cold Lotion—Ice bag—Leeches—Enemata. Nursing of Children: Necessity of Observation—Pain—Vomiting—Convulsions—Loss of Power—Diarrhœa—Rickets—False Croup.

The external remedies now to be considered are those which are more or less in common use, and it is desirable that the nurse should not only know about them, but should be able offhand to apply them quickly, neatly, and thoroughly.

Fomentations. A fomentation is a local application of hot water by means of flannel, in such a form that *warmth* and *moisture* are combined and sustained. It is employed chiefly to lessen inflammation, allay pain, or relieve spasm. Boiling water, flannel (preferably coarse flannel), and waterproof or mackintosh (not oiled silk) are required.

Spread out a towel in an empty basin, and on that lay the flannel, folded eight times or so, and to the size desired. Then pour boiling water upon it, and wring it in the towel as dry as possible. Keep it in the towel till it is ready to be applied to the patient, and just before this is done shake it gently for a second or two to allow the admission of a little air between the folds of the flannel. Having applied it, place over it a piece of mack-

intosh of such a size as will completely overlap the flannel by at least an inch on all sides. See that the whole is kept closely in position by means of a bandage or such like. If one is careful to follow these instructions, a fomentation will continue hot for many hours ; but if, for example, the mackintosh should not completely overlap the flannel, should even a corner of the latter be exposed, evaporation will take place at that point and the fomentation will become cold, clammy, and worse than useless. The admission of a little air is not an unimportant point. The fomentation will not be materially cooled by so doing, while by being made less compact or solid, or, in other words, by having a freer admixture of air, which is a bad conductor of heat, the heat will be retained by the fomentation for a much longer time. Coarse flannel is preferable for the same reason ; there is more air in its interstices. On changing a fomentation, wipe the skin dry, and immediately apply the next.

To relieve spasm or act more as a counter-irritant, one or two tea-spoonfuls of oil of turpentine are often added to the fomentation. It should be sprinkled quickly over the flannel just before the fomentation is applied.

Poultices are much the same as fomentations. They differ only in having some special ingredient as the medium in addition to the water, and in place of the flannel. They are also employed for much the same purposes. They are usually of linseed meal, but may be made with oatmeal, bread, starch, etc. A linseed and an oatmeal poultice retain heat and moisture longest.

Before making a poultice have everything ready and heated—the basin, linen, spatula, etc. Begin by pouring boiling water into the basin sufficient for the size of the poultice, then quickly sprinkle in the linseed meal, stirring the while till the whole is of proper consistence. Spread it now on a piece of linen rather larger than the

size of the poultice wanted, with a spatula or blunt-edged knife which has been dipped in hot water, and turn the margins of linen left over the sides of the poultice. Having applied it without anything between the poultice and the skin (for if properly made it will separate perfectly from the skin when taken off), place over it a piece of mackintosh in the same way, and for the same reason, as in the case of a fomentation.

A *bread poultice* loses heat and moisture sooner than one of linseed, but it is a milder application. Prepare by cutting stale bread into small squares, and put them into a basin which has just been scalded. Pour scalding water over them, cover with a plate and place by the fire for a few minutes. Then pour off the water, beat up lightly with a fork, and apply on a piece of linen. Sometimes a bread and milk poultice is ordered. Milk then is the medium in place of water, and the mode of preparation is the same.

A *starch poultice* is quite unirritating, and is often applied to inflamed skin eruptions. It is made simply as hot starch is prepared, and should be of such a consistence as to admit of it being spread on linen in the ordinary way. All the foregoing, except the starch poultice, which is put on cold or tepid, should be applied as hot as they can be borne.

A Mustard Plaster. This and a fly blister are called "counter-irritants": they act by drawing the irritation or inflammation from the deeper affected part to the surface of the body. A mustard plaster is quicker in its action than a fly blister. Do not speak of a mustard *blister*: mustard should never blister, and if it does so it is apt to leave a painful surface which is slow to heal.

A mustard plaster should be prepared with cold or tepid water; never with very hot water, for that simply kills the ferment by which the active oil of mustard is

formed on the addition of water. Having made the mustard into a paste, spread it on a piece of linen, or on brown paper, to the size wished, and over the surface to be applied to the skin lay a piece of muslin. Fold over the margin of linen which has been left, as in the case of ordinary poultices.

A mustard plaster may be kept on fifteen, twenty, or twenty-five minutes: the time will vary according to the sensitiveness of the skin of the part. Some individuals are peculiarly sensitive to its action. On removing the poultice, sponge the skin gently with tepid water, and apply a layer of cotton wool.

A mustard *poultice* is made with equal parts of mustard and linseed meal. When enough of the latter has been added to the boiling water (which cools the water sufficiently) the proportion of mustard should be put in. A common soothing application to the chest is a linseed-meal poultice with about a tea-spoonful of dry mustard sprinkled over its surface, the whole being covered with muslin, and kept on for a longer or shorter period, according to the amount of redness desired. Mustard plasters spread on cloth and dried, known as "mustard leaves," can be obtained in quantity. Small packets containing a few plasters of convenient size may be had at most druggists. They must be moistened with a little tepid water before being applied.

A Fly Blister may either be in the form of a plaster or of a blistering fluid. It differs from a mustard plaster in being slower, less painful, but more penetrating in its action, and in being as a rule intended to blister. It is applied in cases of deeply seated or chronic inflammations to relieve pain, as for example in neuralgia. The fluid is quicker in its action than the plaster.

The blister plaster being prepared by the chemist of the size ordered, the nurse will probably find there is a small

margin of adhesive plaster left. She need not make use of this to any great extent: if necessary it may be fixed more securely with a turn of a bandage. She may be directed to apply a small piece of tissue paper over the inner surface of the plaster, especially if the skin of the part is rather delicate. If the blistering fluid is used it is simply painted with a camel-hair brush over the part affected, which is then covered with a little cotton wool.

In the case of the plaster it is usually kept on six or eight hours; but on thick-skinned parts, as the scalp, it may require ten or twelve hours or more to blister. As to the degree of blistering to be produced, the nurse will probably get exact instructions. That will depend on many circumstances, such as the disease, the size of blister, the age and state of the patient generally. But it is worth remembering as a general principle that the irritant effect is greater if the blisters break or if we snip them with a pair of scissors, than if they are unbroken. The vesicles or blebs produced by a burn are not as a rule touched, because the less irritation there is in that case the better, and the admission of air to the raw surface always irritates it; but we open the blebs of a fly blister if we wish a greater counter-irritant effect. If this is done, open the blister at the most dependent point, and do not allow the serum or fluid of the blister to run over the surrounding unbroken skin. Afterwards apply a little simple ointment or oil on a soft rag. The dressing will probably require to be changed twice or thrice during the first day, and less frequently as the surface heals.

Dry Heat is sometimes employed, as in lumbago, colic, etc. Flannel alone soon loses heat; but if salt or sand be heated over the fire, or in an oven, and placed in a flannel bag, it will retain the heat for a long time. This form is most suitable in lumbago, where its own weight is no objection, as the patient can lie on the heated salt

or sand. Bran or chamomile flowers are lighter, but do not retain the heat so long. They should be heated over the fire and applied in a linen or flannel bag. In some case a thin clay tile, which is not very heavy, may be heated, wrapped in flannel, and applied.

Cold Lotion is often applied to the brow in head affections, or in certain feverish states. It is a common error to dip a handkerchief, or such like, in cold water, and having folded it several times, apply that to the brow. It speedily becomes warm from contact with the skin, and would require to be continually changed to be of any service. A much better plan is to take one fold of linen, the thinner the better, soak it in water or in vinegar, or in spirits and water, and apply it to the brow. As the water evaporates a greater degree of cold is produced: of course the linen must not be allowed to become dry.

When we wish a still greater degree of cold we employ ice. As an external application it is used chiefly in head affections, very frequently in cases of apoplexy. An ice bag must first be obtained. In an emergency, as such cases usually are, it is well to know that a bladder, such as may be procured at a butcher's, will always be a suitable substitute. The next thing is to break the ice into small pieces, which is best done by applying a darning needle to the surface, and giving it a few taps on the head with a hammer or other weight. The pieces are then put into the ice bag, filling it not more than half full, so as to allow it to lie closely to the head. The application will continue ice-cold till the last piece is melted.

Leeches are applied in the early stages of many inflammations. The first thing to be done is to clean the part carefully, for the leech is a thorough believer in the use of cold water. It will not bite if the skin be oily, or if there be any strong odour about the patient, such as

that of tobacco. Next, catch the leech by the middle with a soft cloth, and lay it on the desired spot. If it does not bite soon, withdraw it gently from the skin, and this will probably make it fasten. But a leech should be handled as little as possible. If it still refuses to bite, the part should be washed with milk, or with sugar and water, or scarified slightly.

On removing the leech, do not adopt the routine practice of putting salt about its head. It makes it disgorge the blood certainly, but it hurts the leech, and perhaps kills it. Rather catch it in the left hand, and by a little pressure with the finger and thumb of the right hand, carried towards the head, you can make it disgorge the blood. It should then be placed in cold water. To encourage bleeding from the bite, the nurse may sometimes be directed to apply fomentations.

Enemata or Injections. These terms usually refer to remedies introduced within the system by the bowel. An intestinal enema is employed as a rule for one of three purposes: to induce movement of the bowels; to check their undue movement; or to administer nourishment or medicines.

1. *To induce movement of the bowels.* For this purpose the injection should be large: a pint at least; sometimes two or three pints in amount; proportionably less for a child. A pint or more of warm water with some soap dissolved in it forms a mild enema. If to this a tablespoonful of castor oil is added, or a tablespoonful of common salt, a more stimulating action will be produced. To administer it the patient should lie on the left side with the knees drawn up; and the nozzle of the syringe, previously anointed with oil or lard, should be introduced within the bowel upwards and backwards. The patient should be directed to retain it as long as possible, and under ordinary circumstances he may after

a little move cautiously round to his right side, or raise his pelvis in such a way that the fluid will be carried further along the course of the bowel.

2. *To check undue movement of the bowels.* This is practically to check diarrhœa. For that purpose one usually employs a cold starch injection of about two ounces. Laudanum may be added by the doctor's directions. The injection should always be small in amount, say, a teaspoonful of starch to a wineglassful of water. It should also be very gently and slowly given, and should be retained.

3. *A nutrient enema.* Here the great error commonly made is to give too much at a time. Three ounces slowly administered is as much as the bowel will bear readily, and if frequently repeated that amount for each injection may be too much. If necessary, the bowel should be first washed out with a tepid water injection. A good nutrient enema may be made with 2 oz. of beef-tea and ½ oz. of cream, and in some cases ½ oz. of brandy in addition. The further addition of a little peptonising powder to aid digestion may be ordered.

For purposes 2 and 3 the injection is usually given with a small glass syringe.

The Nursing of Sick Children. There can be no doubt that the nursing of children is a specialty, and that no one can nurse them well who is not fond of them. The young are the most exacting critics. They take one's measure by a standard of their own, and proceed to dislike those whom they cannot love. It is a case, therefore, in which what is called "coming to an understanding" must be arrived at quickly and completely, if the relationship between nurse and patient is to be at all satisfactory. With the still younger child it is somewhat different. He takes up the position of one who feels he is at a disadvantage, and he is shy and suspicious. In his case

particularly, the nurse's introduction should be gradual. Serious cases apart, the child will claim that the observation be on his part to begin with ; and if, after a little, the nurse proceeds to tell him a story, and tells it well, she will speedily win his confidence and friendship. Except in the case of such young children, it is a great mistake to speak down to them. Speak naturally to them, and they will give you credit for common-sense, and take to you accordingly.

What has been already said about the observation of symptoms applies with special force to the nursing of children. At least, if they are very young, they cannot tell us in so many words what is wrong ; we must judge greatly by signs. And the conditions change more rapidly in the child ; the unexpected in the course of the disease is more apt to occur in his case than in that of the adult. We must, therefore, take careful note of everything that may interpret what is so apt to be obscure, or that will help us in any way to anticipate some untoward event.

We wish in what remains of this chapter to consider first the import of some general symptoms of disease in children, and then refer to one or two diseases to which children are specially liable and which are not referred to in other parts of this work.

It is often said that if a child is "fractious" it is a sign that it is ill. But it may have been badly trained or had no training at all. One will learn much more by watching a child when it is asleep. The rest should be complete ; complete relaxation. There should be no tossing in bed, no kicking off the bedclothes, no grinding the teeth or twitching of the lips, not even the smile that poets tell us is the response to the angel's whisper. The eyelids should be closed and the fingers and toes perfectly limp, that is, free from any twist or spasm.

Pain. If an infant in ordinary health suffers pain from time to time it is probably in the bowels. The cry in such a case is very different from the cry of bad temper. It is not so loud as it is long ; the cry is evidently forced out by the distress to the end of expiration, so that the face is deeply flushed ; and, what is very characteristic, the legs are drawn tensely up on the abdomen. Till medical advice be had there is for such cases no remedy like the complete hot bath, in which the child should be held for three or four minutes. Pain occasioned by lifting or moving the child in any way should be carefully enquired into. It is not necessarily felt at the seat of the mischief. For example, the pain of hip-joint disease may be felt at the knee. "Growing pains" must never be disregarded. They are quite likely to arise from rheumatism, which, especially in such an imperfectly developed form and in children, is apt to lead to serious secondary affections, notably of the heart. In acute affections of the head the cry, if any, occurs at intervals, and is short and sharp, the child being either restless and rolling the head, or inclining to lie on his back, listless and indifferent. In lung affections which are serious, the child will probably not cry at all.

Vomiting. In the case of infants, if it occurs soon after food, and in small quantity, it only means that too much food has been taken, and nature is insisting upon its being returned. But if vomiting has little or no relation to the last meal, if it is repeated, and especially if the age is beyond that of infancy, it may indicate serious disease. It might be the first symptom of one of the infectious fevers, of some grave affection of the bowels, or of some serious disease of the brain.

Convulsions. As they are always alarming to the onlooker, it is well to know that, owing to the greater sensitiveness of the child's nervous system,

they are occasioned by much slighter causes in the young than in the grown-up. They not infrequently usher in one of the fevers, measles for example, and may only correspond to the headache or the shivering that in similar circumstances would affect the adult. The irritation of teething, of indigestion and of worms, is another common and less serious cause ; and a very common and more continuous cause is that form of bad nutrition known as rickets. Convulsions are serious if they arise from any disorder of the brain, whether acute or chronic. The treatment is to seat the child in a hot bath and apply cold water to the head, and get medical assistance. If the nurse can report on their frequency, how and where they began, if chiefly on one side of the body, and so on, so much the better.

Loss of Power. Any immobility (inability to move), limpness, or diminished power in a limb or limbs should be reported to the doctor at once. It may be the beginning, or more than the beginning, of a paralysis which generally makes its appearance in early childhood, and is called therefore "infantile paralysis"; or it may arise, not from disease of the spinal cord, but from disease of the bones of the spinal column. All such complaints demand careful treatment, and only this note of warning can be made here.

Diarrhœa is a common symptom of disease, as well as itself a disease of children. The intestinal canal, as the food tract is called, is a sensitive part of the child, in order that all that would injure the tender growing organism may be speedily expelled. "What does the child get?" referring to one of about two years of age. "Oh, he just gets what's going." "And what is going? What does he begin the day with?" "Well, he gets bread and butter and tea for his breakfast, and maybe ham and eggs with his father." This to a child who has

been suffering for some time from diarrhœa. It is not surprising that the doctor has to be sent for. But diarrhœa may be the result of sudden chills, warm weather, or of disorders of other parts of the body. The lining membrane of the bowel will be inflamed and irritable, or relaxed; such a condition requires a diet that will be *soothing* and *astringent*. Milk, especially boiled milk, has to some degree these qualities naturally, and the addition of equal parts, or perhaps a third, of lime water makes it more astringent. A little isinglass, dissolved first in water and then added to the milk, becomes somewhat of a protective to the irritable bowel. In severe cases a very good preparation is one pint of barley water mixed with the whites of two or three eggs beaten to a froth; or best of all, give simply whey. The raw meat treatment may be ordered by the doctor. What is wanted here is to leave all the shreddy fibrous tissue and retain only the soft pulp of the meat. This is best done by taking a small piece of lean juicy meat, and laying it on the side of the plate; scrape it with a knife towards the centre of the plate, while the left hand holds the meat in position. Each stroke of the knife will bring away on its edge some of the soft pulp, and this can be continued till nothing but indigestible fibre is left. A little salt may be added to the soft meat, which can then be spread on thin toast or biscuit. For a child of one year old it is usual to begin with one ounce in the day divided into three parts.

Rickets. This disease of impaired nutrition in early childhood is so common in our own country, is so great a source of new evils and new dangers to the young sufferer, and for the future so fruitful of what is unsightly and enfeebling, that it is the duty of everyone to know at least something of what it is and what it does. Rickets, speaking generally, is indicated by curvature or other

alteration in the shape and form of the bones. It is a disease peculiarly prevalent in large towns; and our own city shares, with a few others, the unenviable reputation of being one of its great centres. The want of pure air and of light and sunshine, and a general neglect of the laws of health are common causes of the disease; while improper food, especially excess of the starchy elements during infancy, is supposed by most authorities to be the more special cause. The water supply of Glasgow has often and most undeservedly been blamed for its prevalence.

As to symptoms, before the long bones begin to bend there is usually observed some enlargement of their extremities, and as this is readily noticed at the wrist, and is often accompanied by a relaxed state of the muscles, the idea of a "double joint" has found its way into the popular mind as a satisfactory explanation of the peculiarity.

Before this stage is reached, the child will have shown some signs of general debility, such as profuse sweating, particularly about the head and at night. And there is one early symptom that deserves attention, namely, a general tenderness of the body. The child is clearly suffering from aching pains more or less over the whole body. It cries when touched, or at least if lifted incautiously; or perhaps when some particular limb is moved, or if it is put down to walk—a natural provision, doubtless, against the use of the readily yielding limbs. It is of great importance that this symptom should not be overlooked, and a friendly caution against forcing the child to walk will be timely and valuable advice. Should the mother think the child is simply peevish or petted, and insist on it walking, the lower limbs will gradually bend under the weight of the child.

The disease depends on an imperfect development of bone; and as growth is most active at and around the

ends of bones, it is there the enlargements are most obvious. The alterations in the shape of the bones, though chiefly, are not exclusively found in those of the lower limbs. Curvature of the spine is not an uncommon result of rickets; so also that flattening of the sides of the ribs which forms what it is called the "pigeon breast." In this case the movements of respiration have caused the softened ribs to yield inwards, and this again causes the breast bone to be projected forwards.

As a neglect of ordinary sanitary laws is the great cause of rickets, obviously the right treatment is to attend to these neglected laws as quickly as possible. Good food, warm clothing, sunlight, and as much fresh air as can be obtained *without the child requiring to walk for it*, are the safeguards against the further advance of the disease.

False Croup. This term is frequently applied to a common sudden attack in children which has nothing whatever to do with croup, but is simply an inflamed throat with the addition of more or less spasm in the affected part such as children are apt to have. The child has the ordinary feverish cold, and, towards the evening perhaps, a hoarseness of the cough attracts attention, and the sound of constricted breathing is heard in the throat. Shortly after midnight, when all but the watchful mother have retired to rest, the difficulty of breathing increases, and actual suffocation may seem to threaten. The doctor is then sent for, and by the time he arrives the spasm has passed off, and the child is almost himself again. In such an emergency the hot bath gives speedy relief, or a large sponge wrung out of hot water and applied to the throat may be sufficient. Thirty drops of ipecacuanha wine is a safe emetic to give, and can be repeated in ten minutes, if vomiting does not occur. The result will be not only to relieve the spasm, but probably to rid the stomach of indigestible food.

CHAPTER VI.

The State of Fever—The Cause and Course of an Infectious Fever—Measles—Whooping Cough—Scarlet Fever—Enteric Fever—Smallpox—Vaccination—Diphtheria—Rheumatic Fever.

The word fever is used in two different senses. It may either mean an increased heat of the body generally, a feverish or febrile temperature; or it may mean *a* particular fever, as Scarlet Fever or Measles. The former meaning is the older of the two: the feverish state.

This state is an essential feature of acute disease. It means an unusual or abnormal activity of the whole system; and indicates the action that the body is taking to repel some disease, or at least the disorder or alarm, as we might say, into which the system is thrown, when brought face to face with a dangerous foe.

We cannot get altogether away from the old division of fever into three stages; the cold, the hot, and the sweating. This last stage is not always present, but there is always in a completed course of a particular fever at least the subsequent "cleaning-up process" on the part of nature, of which the sweating of the third stage is an occasional feature. But every fever has at least the first two stages named. Even a trifling febrile disturbance begins with a cold stage, for it is the shock or shiver of the body at the sudden and unexpected assault.

And so when one says he caught a chill and then took ill, the fact is that the chill was the illness itself. And what has made this unprovoked assault upon the body? Everyone nowadays is ready to answer "germs," and for practical purposes the answer is correct.

These germs, or *microbes*, are living bodies or organisms so minute that they can easily get along the smallest blood-vessels to work their mischief in every or any part of the human body. Many of them are much smaller than a red blood corpuscle, and they all require the highest powers of the microscope to detect them. And so it can hardly be said that they present to the ordinary observer any very broad distinguishing features. But by the biologist they are classed as round, like berries; long like threads; not so long and thicker, like rods, etc. Some are straight and others are curved rods; and some are spiral, like corkscrews. Sometimes the berries are strung together like a string of beads. The germ of many a disease is still undiscovered. Those of cholera and consumption have been known for years, while in the case of measles and smallpox it is still unknown.

To return to the state of fever, it is now divided into the following stages. *The Incubation Stage.* The term explains itself. The disease is incubating or hatching. It is there, but it is not visible. The germ, or spore, has got into the body, but the disease is still in the egg. Unfortunately some of these germs keep fresh an uncommonly long time for eggs, especially if they are kept dry. That is one reason why a particular disease may break out so unexpectedly. And once the germs gain admittance to the human body, and that body not strong enough to overcome them, they gradually develop, some in a day or two, others it may be after many weeks. For different fevers have incubation periods of different lengths.

The Invasion Stage. This begins the moment the person

feels there is really something wrong with himself. The infecting germs having been duly hatched in the patient's body, they have begun to assert themselves as disturbers of the peace. To the constitution of the unfortunate sufferer this comes as a shock, and he shivers. He complains of headache and looks pale. He feels cold, but in reality his temperature has already begun to rise. This may continue for a few hours, or for a day or two. Flushes of heat then alternate with the feeling of cold, until at length the fever proper is established, and is said to have entered upon its *course*. It has now reached the stage of eruption if it is a fever with a rash. The face is flushed, the skin hot, and the pulse quick. The fever will probably now indicate how it is going to run. It may be a *continued fever*, in which the temperature keeps up pretty much at a level; or it may be *remittent*, in which the fever, say in the morning, falls considerably, but not to normal; or it may be an *intermittent* fever, in which the temperature falls to normal at certain times. Certain fevers, such as scarlet fever and measles, have, if there are no complications, a certain course, which we can to a great extent foresee. Others, like rheumatic fever and diphtheria, have no such regular course.

When the fever has run its course, there is then the *crisis* or "turn" of the fever. It marks the death of the infecting germ. The fever now declines with varying rapidity in different fevers, and there may be at the same time a more or less distinct perspiration. This corresponds with the sweating stage of the older writers. Finally, the *Stage of Convalescence* is reached. There is something to be said about the nursing of a fever case under each of these stages, omitting the incubation period which is not one of fever proper.

A nurse does not often see a patient during the invasion stage, especially if it is short and sharp; but it is just in

such a plight when one sits chittering miserably over the fire that a hot drink gives the greatest relief. But shivering, or a *rigor* as we say, may occur also at later periods in a fever. This must always be reported. However slight, it is a sign of fresh mischief of some kind, and if well marked it probably indicates the beginning of an important or even dangerous complication which demands immediate attention. In a long invasion stage, such as is likely to occur in enteric (typhoid) fever, the nurse might be the first to observe the rash.

When the fever has entered on its full course, the nurse's duties are chiefly of a general character, the details of which we have already considered. A carefully-kept temperature chart will inform the doctor of the exact course the fever is taking. But the nurse must remember that if a temperature becomes very high, the height itself may be a danger, and is always at least a source of discomfort and weakness to the patient.

Headache is a common symptom in the early course of an acute fever. The cold lotion applied to the head (see p. 56), or a piece of ice in the hollow of a sponge will in some cases be of great benefit, while in others a small but very hot fomentation to the brow will give more relief.

A little later *delirium* is not an uncommon symptom. Slight wandering towards midnight may occur even in mild febrile attacks, and only needs complete quietness, the nurse the while assuring the patient, or seeking to dispel his fancies without discussing them. More marked delirium may call for gentle but firm restraint and constant watching that the patient may do himself no injury. There are many possible complications in the course of an acute fever. Some of these will be noted under special fevers. They all imperatively demand implicit obedience to the directions of the physician.

In considering shortly some of the infectious fevers of our country, we shall begin with the three which are most common, namely measles, whooping cough, and scarlet fever.

Measles. This is one of the most infectious of fevers, and it is so from the beginning of the attack. It is a dangerous disease on account of its liability to set up some form of lung trouble. It is a great mistake, particularly on the part of the town dweller, or where the children are very young, to think that measles is a trifling disease which it is better to get past. On the contrary, let it be postponed as long as possible: if a child escapes measles till it is over five years of age its chances of recovery are very greatly increased.

There are three or four days of an invasion stage, during which the child is probably fretful and showing symptoms like those of a cold in the head. A sneeze may be the first symptom; and very early the eyes have a red, watery look, and the child turns from the light.

The rash appears on the fourth day, or even later, and is first seen on the face, most likely about the forehead or the temples. It usually appears as little round spots which run together into patches of a somewhat dusky red colour. In the following days the rash gradually passes down over the body.

The characteristic symptom of measles is catarrh; and the great object of treatment is to prevent it passing down into the chest and becoming a complication. The patient must be from the first kept strictly in bed, well covered by the clothes, and in a comfortably warmed, somewhat darkened room, till the doctor indicates that this is no longer necessary. The period of infection ceases in not less than two weeks from the appearance of the rash.

Whooping Cough. Like measles, this is a highly infectious fever, and is also highly dangerous, especially

during infancy. It is infectious through the atmosphere, and apparently to a considerable distance, but it need hardly be said that merely hearing the cough will never convey the disease, as is popularly supposed.

It has no rash, but instead the peculiar spasmodic cough from which it takes its name. During the first ten days or so, when the cough is developing, it may be thought to be only an ordinary cold, with a specially tickling cough.

The nurse may be directed to count the number of coughs. This is usually greater, and the coughs more severe during the night; and a diminution in this respect is frequently the first indication that the disease has begun to lessen. It is probably this cough that has led our minds away from the fact that whooping cough is a most dangerous fever. We are slow to believe that it ranks third in the fatal diseases of infancy. But it is so; and it can as profoundly undermine the health of the sufferer as measles or scarlet fever, and this even after the turn in the disease itself has been passed. Yet children with whooping cough are carried through the streets, and we meet them as we travel by car or train. A well-known authority, Dr. Dolan, draws attention to this, and rightly insists on the necessity of keeping the child with whooping cough as much apart as the sufferer from any other infectious disease.

Here, as in all fevers, the nurse will be expected to give the lightest food, in small quantity and at frequent intervals. The stomach must on no account be overburdened. The period of infection ceases in probably not more than two months from the commencement, provided the characteristic spasmodic cough has been absent for at least two weeks.

Scarlet Fever or Scarlatina. The latter term means the same thing, and not a milder form of the disease as

many suppose. No fever presents such a varying degree of severity as scarlet fever; but even viewing it collectively, it is the most dangerous fever of childhood. It is not infectious at so early a period of the disease as measles or whooping cough; but owing to one circumstance—the shedding of the scarf skin in little dusty flakes or in larger pieces during convalescence (desquamation, as it is called), which carry with them the infecting particles—that infection may remain about the house, or on one's clothes, in undiminished power for a long time, and be transmitted also to almost any distance.

The fever sets in suddenly, and the invasion period may be less than 24 hours; so that there is no time for a day or two's preliminary peevishness as in measles; the child from the first is really ill. The rash appears earlier than in any other fever. It may be seen on the very day that the child is first noticed to be ailing; most likely about the side of the neck, the inner surface of the arms, and the upper part of the chest. It begins as a collection of little red dots or points, which soon run together, and cause a general red blush of the skin. The back of the mouth and throat is early red, and in most cases painful. The small red *papillae* (the little elevated points which are dotted over the tongue naturally) project through the white coating that has come upon the tongue; this, however, soon disappears, leaving the whole tongue very red, and forming "the strawberry tongue" of scarlet fever.

Enough has been said to guide one to the early detection of the disease as a rule. The severe forms demand the most constant and skilled attention; and the course and complications of the disease need not be dwelt on here. But these two points must always be borne in mind: (1) that the mildest case requires equal care, both throughout the fever, and during convalescence; and (2)

that from the mildest case one may take the severest form of the disease. And these are just the questions that concern the nurse most directly in her care of the case.

1. *How the patient should be cared for, particularly during convalescence.* The nurse must never overlook this, that however mild the case, there is always a liability to dropsy occuring during the later stages of the affection. The kidneys then, somehow, are apt to become affected and their functions disturbed. If so, a little swelling (œdema) under the eyes will likely be observed, and albumen found in the urine. To prevent this, if possible, taking place, the patient should be carefully protected from cold or draughts. While in bed he should be always well covered with the blankets; and when allowed to get up, should wear flannels, and remain in the warm room, and clear of all draughts, till express permission to leave his bedroom is given by the doctor.

2. *How is infection to be prevented?* Besides the ordinary precautions, the most particular care must be taken to prevent the little flakes of skin, already referred to, from escaping with their dangerous freight. For each is laden with infecting particles, as potent for mischief, under favourable circumstances, as any ship of war. This peeling, or desquamation, begins almost immediately on the disappearance of the rash. It will occur first where the rash began; and if the rash altogether has been slight, the peeling will be correspondingly difficult to detect. If in doubt, look for it carefully round the roots of the finger nails.

As soon as there is the least appearance of desquamation, the body should be rubbed over daily with some kind of oil; camphorated oil does very well. This prevents the flakes from flying about the room; and admits of them being wiped off with a rag and burned, or after

a time washed off with a bath, tepid at first, and carbolic soap. All dust in the room should be carefully collected and burned; and the simple expedient of shaking the patient's stockings over the fire, after they have been worn for the day, will often lead to a wholesale destruction of dangerous germs. As regards the sick-room itself, everything that would harbour dust, everything that cannot be readily washed, everything indeed *not needed*, should be removed.

Desquamation will in all probability continue long after the patient is able to be out of bed and dressed. In that case his wearing apparel as well as bed-clothes will require to be disinfected. To this we shall refer immediately. All the members of the family who have not had scarlet fever will probably have been sent from home; meantime, besides the precautions required as regards the sick-room, the whole house must be kept thoroughly ventilated. The period of infection ceases when desquamation ceases, but in no case in less than six weeks.

We shall now put in tabular form for convenient reference some generally recognised rules for the prevention of scarlet fever.

1. Separate the patient completely from the other inmates, and to the top of the house if this can be done.
2. Hang a sheet, kept wet with a 1-40 aqueous solution of carbolic acid (*i.e.* a wineglassful of fluid carbolic acid to every gallon of water) outside the door of the patient's bedroom. (We mention this rule, as in some cases the nurse may be directed to observe it.)
3. Cups, glasses, spoons, etc., and the nurse's own hands, to be washed in carbolic acid solution

(1-40), after having been in contact with the patient.

4. Bed- and body-linen to be put into carbolic acid solution (1-40) for half-an-hour, or into boiling water before being removed from the room, to be washed afterwards in the ordinary way and exposed for a time to the fresh air. (Should there be of necessity any delay in carrying out the above, rather put them into a tub of simple water in the sick-room than have them lying dry in a corner.)
5. The nurse in all cases to wear a cotton-print or some dress that is easily washed.
6. The rubbing in of camphorated oil during desquamation, or warm baths with carbolic soap as already mentioned.

As to the disinfection of bedding, that had better be done by the sanitary authorities. But it may be ripped up and the "ticks" treated as the other bed-linen. Hair may be put in boiling water and feathers exposed to steam.

In no other fever is it so necessary to have the bedroom disinfected, so we shall describe here how that is conveniently done. The room must have only such furniture remaining in it as will not be damaged by sulphur fumes. Put some pieces of sulphur or brimstone (one pound or so) on a shovel or iron lid, and set this on a couple of bricks which have been placed in a small bath or tub containing water to the depth of an inch or two. Place this bath in the middle of the room. Then having carefully closed the window and fireplace, and also pasted paper over any crevice by which air might enter, set fire to the sulphur with one or two pieces of live coal, *get out of the room immediately*, and shut the door. Finally paste paper round the edges of the door and over the keyhole.

With the precautions mentioned there can be no danger of setting the room on fire. Let it be kept thus closed over night, say for ten or twelve hours; and then open windows and doors to admit of free ventilation. Afterwards the paper should be stripped from the walls, the woodwork washed with carbolic solution, the room repapered, and the ceiling whitewashed.

Enteric Fever. (In England, "typhoid fever.") A mild attack of this fever, such as is more likely to occur in childhood, is often called "gastric fever." The disease is not conveyed from the patient through the air, but through the discharges from the bowels and the bladder. Practically it is found that contaminated drinking-water is the most common medium of infection. The discharges from some previous case, say about a farm, are carelessly or ignorantly thrown out on a manure heap. A well, all too near, becomes polluted, or perhaps a stream which only a mile further along its course happens to supply the village with its drinking-water. It is not difficult to understand how milk may thus become polluted, and how from its distribution over a wide area it may carry the infection to distant places whose sanitary surroundings are entirely satisfactory.

Enteric fever has a very gradual invasion period, and for several days the patient may complain of little else than "heats and colds," some headache, and probably pains in the back and limbs. The *continuance* of these symptoms attracts attention, and spots should be searched for although there may be no other characteristic symptoms. If, in addition, there is pain or pressure in the abdomen, and loose, yellowish motions, the suspicion of enteric fever will be very strong.

The rash appears at a variable time, usually between the seventh and the twelfth day. It consists of round rose-coloured spots, which are pretty well defined, as the

surrounding skin is quite unaltered. They do not all appear at once, but come out in successive "crops," each of about three days' duration.

Meanwhile the abdominal pain, and as a rule the diarrhœa, continue, reminding the nurse that the bowels are the weak point in this fever. Some delirium may set in about the end of the second week, and during the third week the patient will require all the care and attention that a serious fever demands. About the end of the third week a *gradual* "turn" for the better may be expected, but even when convalescence has apparently begun a relapse may occur with a repetition of all the old symptoms.

The treatment will be mainly directed to the condition of the bowels. Of course the patient will be kept strictly in bed. "It is a good rule never to allow the patient to get out of bed to the night-stool, after the tenth day of his illness, until convalescence is fairly established." At the same time, it is often of great service to have two beds in the room, so that the patient may be changed from the one to the other perhaps twice in the 24 hours. In this way sleep will sometimes be procured after other measures have failed.

Milk given in small quantities at a time will likely be the diet prescribed. The nurse's great duty is to see that *nothing else is given*, either by herself or another, without orders. Probably she will be directed to give in addition a little ice, soda water, or lime water. The same strict adherence to orders is necessary when convalescence has apparently begun. The patient begins now to feel hungry and craves for a change. But with the physician must rest all the responsibility in this respect, such as allowing beef-tea, chicken soup, arrowroot, etc.; and as to stimulants he will direct the exact amount to be given, and at what times.

Many emergencies may arise in the course of enteric fever requiring immediate and skilled treatment, but these we can hardly take up here.

To prevent enteric fever being communicated to others, the following rules must be attended to :

1. Discharges to be received into vessels and powdered freely over with chloride of lime or similar disinfectant ; the vessels to be washed afterwards with a solution of the disinfectant, and some of this solution kept in them until they are required again.
2. A similar disinfectant solution to be poured down sinks, water-closets, etc., occasionally.
3. Bed and body linen to be put into an aqueous solution (1-40) of carbolic acid before being sent to the laundry.
4. Drinking-water, milk, etc., to be boiled before being used.

Smallpox. One does not need to be told that this is a dangerous disease, and in its severe forms a dreadful disease. Everyone should know something about it apart from the question of ever having to nurse a case of it. It is about as highly infectious at the moment as measles is, while, like scarlet fever, it retains the power of infection for a long time, the little dry scabs that are thrown off in the last stage of the disease preserving the germs alive just as the flakes of skin do in scarlet fever. Further, as in the case of scarlet fever, the worst type of the disease may be got from the mildest. There is nothing therefore about smallpox that can be taken on trust : and the moral is to be vaccinated and not take it at all. In this connection it is important to know something of the incubation stage of smallpox. This stage is seldom less than twelve days, whereas vaccination takes effect, that is to say, is a protection, by the eighth or

ninth day. So that if a person discovered only to-day that he had been in contact with a sufferer from smallpox two days ago, and gets vaccinated at once, he would almost certainly be protected from the serious disease.

The fact that a case so mild as possibly to escape detection can set up in another the most severe type of the disease constitutes a very grave danger to the community. Unfortunately this danger is further intensified by another peculiar feature of smallpox. When the rash appears, which it does about the third day, the fever which had been rising since the invasion of the disease now declines ; and if it be a mild case the patient may go about again as if nothing had happened. In such a case the fever, which in a well-marked case would return with the maturing of the eruption, either does not do so or is so slight as to be unheeded, while the rash quite possibly is not noticed by anyone who can recognise it. And so the affected person continues at his work and the disease is spread far and wide.

Vaccination in infancy is a protection against smallpox till the tenth or twelfth year, when it would be well for everyone to get vaccinated a second time. After another similar interval, especially if smallpox were prevalent in a district, it would certainly be advisable to be vaccinated once more.

Diphtheria. This is also a general infectious fever, of which the throat mischief is but the localised expression. It is not infectious at a distance. The patient's breath will not convey the disease ; but, on the other hand, the discharges from the mouth and nose are laden with the poison. These discharges come from the mucous membrane of the back of the mouth and throat, whereon the exudation has taken place which forms the greyish skin or "false membrane" that characterises the disease.

In a severe case there is always great prostration

requiring the most nourishing diet, as beef-tea, cream, egg-flip, etc., given at regular intervals and in prescribed quantities. The doctor will also give precise directions as to the kind and amount of stimulant, and how often it is to be given. The disease being infectious chiefly through the discharges from the mouth and nose, the nurse will not fail to clear away with a soft rag anything that is coughed up, and for her own sake she will be careful not to stand close up to, and right in front of the patient's face. A sudden cough at such a moment would be almost certain to convey the disease. All rags used to clean the mouth and nose must be immediately burned.

The nurse will probably be expected to keep the room at a higher temperature than in most other diseases, namely from 65° to 70° Fah. Should she be directed to have a moist atmosphere round the patient, she will require a kettle with a pipe by means of which the steam from it may be carried near to the patient. A blanket tent for him also is sometimes ordered; it may be made with blankets hung round and over an ordinary clothes screen.

During convalescence the patient must on no account be allowed even to sit up in bed without the express permission of the medical attendant. Fatal syncope (or fainting) might be induced by suddenly leaving the recumbent position.

Rheumatic Fever. Although this is not an infectious fever it will be well to note here one or two special points in the nursing of the complaint. Of the first importance is the avoidance of anything that will chill the patient. To emphasise this, one is almost justified in saying that here warm air is more important than fresh air. The least exposure to cold may greatly aggravate the disease. If details are left to the nurse and the case is at all

severe, she should see that the patient lies between blankets and that he wears a flannel nightdress. One, or more likely several, of his joints will be swollen and painful; and it may be necessary to wrap them in cotton wool and even place a cage over a joint to protect it from the pressure of the bed-clothes.

Being a disorder of the whole system, the local joint affection passes readily from one joint to another, for example, from the knee to the wrist, from the elbow to the ankle. And so no arm or even hand must be exposed (as might readily be done in order to read a newspaper or book) till the physician's permission is obtained. A sour-smelling, profuse perspiration is a characteristic symptom of the disease, which often causes considerable discomfort. Should this be the case, the skin may be dried with a warmed towel; but it must be done quickly, and with as little exposure as possible.

It is right that the nurse should know also that the great complication of rheumatic fever is heart disease. She must at once then report any sudden rise in temperature, complaint of oppression over the heart, palpitation, or similar symptom, which often indicates the beginning of heart mischief, or it might be the onset of a dangerously high temperature.

CHAPTER VII.

HYGIENE.

The House: Situation—Construction—Ventilation—Methods of Ventilation—Bad Air and Tuberculous Disease—Consumption—Mode of Infection—Prevention of Infection.

THE subject of hygiene includes everything that has to do with the preservation of health. One would suppose that the natural feeling of self-preservation would make this subject of study unnecessary. But it is not so. Man wishes to keep well, but he does not know instinctively how to keep well. He has lost that natural instinct which is universal in the lower animals, and which is in the main always right; and having in its place the gift of reason, he is often unreasonable, and often wrong. He has certainly lost, for example, that instinctive knowledge of what is the best food for himself which the lower animals possess, a point that we shall notice later.

But neither does he know how to build the best house for himself; and he has no natural dread of the evils of overcrowding. It is these evils that we purpose in the first instance to consider.

THE HOUSE.

The Situation. When we speak of overcrowding we mean the overcrowding of houses, as well as of the people

in them. That is too often a matter which is beyond the control of the individual. To succeed in life he thinks he must go to the city; and there he must begin with such a house as he can afford, whether it be in a crowd or not. But it is well that everyone should have an ideal before him; well that he should know what to aim at. It is well that he should know that pure air and pure water, with bright sunshine over all, are the great necessaries of healthy life, that he should seek for a house with as much open space about it as possible, and that he should prefer one on a hill to one in a hollow.

The house should be built on a moderately elevated spot, with a fall from the building in one direction at least. The soil should be dry and porous. By that is meant a soil through which the surface water can readily pass and get freely away. Of these, gravels and loose sands are the driest and warmest. The water gets easily down through them. But it must also get freely away. There is always below the surface of the ground, at various depths, what is known as the sub-soil water or "ground-water." The deeper this lies the better. If it lies less than eight or ten feet down it is unfavourable, or may be positively bad; while 15 or 20 feet is desirable if it can be had. We must understand, then, that however porous the soil is, if it be of little depth, and if for any reason the water cannot get freely away, it is still an unfavourable soil. Nothing will make it so more readily than an underlying layer of clay. Through this the water cannot pass, and it will simply be retained in the upper porous gravel, as has been said, like moist sand in a plate. In themselves clayey soils are the worst of all. They not only prevent the escape of water, but they take it up into their own substance in large amount; they are therefore always damp and cold. We see, then, that from such a soil the water can never naturally drain away, and only the most thorough system of

artificial drainage can ever make them at all suitable for building on.

Besides the ground water there is also the ground air to be considered, that is, the air which is mixed up with the soil that lies between the ground water and the surface. From various natural causes, such as changes in the pressure and temperature of the atmosphere, as well as alterations in the level of the ground water itself, this air is continually in motion; and containing as it does much more of the poisonous gas carbonic acid (of which we shall speak later) than the atmosphere, it will become a source of danger if precautions are not taken to prevent it entering the house by means to be mentioned immediately. It is chiefly from this consideration that "made soils," that is, soils of tipped rubbish, are most unsuitable for building on. Containing as they probably do a large amount of decomposing animal and vegetable matter, there is sure to be a correspondingly large amount of poisonous gas formed; and it is only after two or three years at least that these soils become fairly suitable as sites. Nature will in time bring about an improvement. This will come sooner if the soil is porous, owing to the admixture of fresh air; longer if there is a sub-soil of clay keeping the refuse soil continually damp.

The Construction. Beginning at the foundation, there are these two evils that we must endeavour to overcome, namely, the admission of the ground air to which we have referred, and of damp. The former will always be attracted by the warmth of the house, and will always tend to make its way in unless free admission is given to the pure atmospheric air. But this ground air can be effectually kept out by covering the whole site of the house with a compact layer of cement, or with a layer of asphalt. To keep out the damp, which will pass up into the more or less porous walls by what is known as

"capillary attraction," as water will into a sponge, the "footings" (or foundation) of the walls should rest on the bed of cement; and above the footings what is called a damp-proof course should be laid before the walls are continued higher. Slate laid in cement, or a layer of asphalt, makes a good damp-proof course. Further, if there should be a sunk flat or basement floor under the natural level of the ground, there should be cleared away from its walls sufficient ground to leave a small area or open space all round; or else the walls themselves of the basement should be double, with an air space between, which will prevent damp getting through.

The walls should be substantial and the roof rain-proof to keep the house warm and dry; and the rooms should be lighted by windows reaching almost to the ceiling and which can be easily opened. The humblest lodger is entitled to have his habitation wind and water tight; but he should also see that he has sufficient light and plenty of fresh air. Further, he should see that there is a sufficient supply of good water, and that the drains are in thorough order.

Ventilation. The object of ventilation is to get into the house the pure fresh air from without. Fresh air is one of those good things of which we cannot have too much. And there is plenty of it to be had. It completely envelops our world. It rises above the earth for many miles and goes down into the depths of the sea. It is the food that we get through the lungs, and we should therefore know something about it and see that we get it good.

Air may be regarded as invisible, without colour, taste, or smell. We might almost doubt its existence did it not remind us of its presence in the gentle breeze, and sometimes of its power in the raging tempest. We know then that it exists; but what is its nature? It is not a

simple body ; it is not one of the elements, as the ancients supposed, but really a mixture. It consists mainly of two elements, *oxygen* and *nitrogen*. Oxygen is a gas, without colour, taste, or smell. It sustains animal life, and supports combustion, *i.e.* enables fuel to burn. It is the life-giving principle of the air, although there is only one part of it to four of nitrogen. Nitrogen is also devoid of colour, taste, or smell. It extinguishes life and light. It modifies the vital properties of the oxygen, or, as has been said, "it dilutes the oxygen as water does wine or spirits." These two elements form almost the whole bulk of the atmosphere ; but there is a third body, which, although there is only a trace of it in the air as a whole, is so poisonous in itself, and so readily increases in circumstances that concern us very directly, that we must give it our most careful attention. It is called carbonic acid, or carbon dioxide.

Carbonic acid is a compound body devoid of colour, but with a slight smell and a sourish taste. It extinguishes light, and, if breathed undiluted, destroys life instantly. Pure air contains, as we have said, only a trace of it. There is rather less than one part of carbonic acid in 2000 parts of the atmosphere as a whole. More exactly, there are in 10,000 parts of pure air 2096 parts of oxygen, 7900 of nitrogen, and 4 of carbonic acid. So poisonous is this last gas, that if, instead of 4 parts in 10,000, the air of a room contains *more than* 6 parts in 10,000, one coming in from the outside fresh air to the room will feel it to be more or less close, although those who have been in the room for some time will not. It is the occupants of the room, of course, who have made it so. Either there have been too many of them or they have occupied the room too long. For with every expiration we give out this poisonous gas and make the air so far unfit to be breathed by our own selves again. But besides breathing out this

gas, we continually remove some of the life-giving oxygen of the air, the carbonic acid expired being formed by the combination of oxygen with the carbon of our bodies.

Thus a double injury, so to speak, is being done to the air when we breathe it. And when we consider that every human being and all the lower animals are doing this, that everything that burns or decomposes is doing the same, we are apt to wonder why the whole atmosphere around us does not at last become unfit for breathing. Well, there are powerful natural forces continually at work to correct this. These are the wind and rain, which carry away impurities, and in their stead bring to us pure air; but in particular the balance of nature is maintained by the fact that plants do exactly the opposite from us. They take in carbonic acid and give out oxygen. The vegetable kingdom lives on what the animal kingdom would die on, and *vice versa.* But there is one exception to this law which we must all remember. *During the night* plants, like animals, give out carbonic acid. Not to such an extent as to undo the important office they have fulfilled during the daytime, but quite sufficient to make it necessary for us to learn this important lesson, that we must never allow flowers to remain in a sick-room during the night.

To go back to our room, which was more or less close. It contains more than six parts of carbonic acid in 10,000. It therefore exceeds *the standard limit of impurity* which has been fixed at this 6 parts in 10,000 or 0·6 cubic feet per 1000. We know that there were originally in the room 4 parts per 10,000 or 0·4 cubic feet per 1000, and this is called the original or "natural impurity." This only allows 2 parts per 10,000 (0·2 cubic feet per 1000) of respiratory impurity, the amount the occupants of the room will add, notwithstanding ventilation, to make the six parts. In other words, there should not be

more than ·06 per cent. carbonic acid gas in a room, of which ·04 per cent. is "natural impurity" and ·02 per cent. is "respiratory impurity."

Now an average adult at rest gives off about ·6 cubic feet of carbonic gas in the hour, but as there is only allowed him the ·2 cubic feet of respiratory impurity, it follows that he requires 3000 cubic feet of fresh air in the hour in order that the amount of carbonic acid in the air of his room may not exceed the standard limit of impurity. We aim, then, at 3000 cubic feet in the hour as the smallest amount of fresh air that should be supplied to each adult in a room. To see how this can be obtained we must consider the question of cubic space.

Cubic Space. The average temperature of the outside air of our country is such that the air in a room can be renewed by it about three times in an hour without causing a perceptible draught. We see, therefore, that a cubic space of 1000 feet for each adult will suffice to give the required cubic feet of air in the hour. If the incoming air were first warmed, the air in the room might be renewed by it five times in the hour without causing a sense of chill, but such a rate of admission is not easily obtained by natural ventilation, and if the air were not decidedly warm the draught would be unbearable. It amounts to this then that a person sitting in a room the length, breadth, and height of which were respectively 10 feet (giving 1000 cubic feet), would have the proper amount of air space, because the outside air at an average temperature could enter at the required rate without causing a feeling of draught. This 1000 cubic feet of space for each adult is the ideal standard; unfortunately it is only ideal. It is far more space than most people can afford. The poorer classes who are compelled to live in small crowded rooms may have as little as 200 or 250 cubic feet; and 300 cubic feet is often all that can be

insisted upon in registered lodging-houses and similar institutions. The authorised regulation space for soldiers has had to be fixed so as to give 600 cubic feet per head. But in hospital, where we have the sick to deal with, who are practically confined to their ward day and night, a cubic space of 1000 or 1200 cubic feet is allowed, and in a ward with infectious disease it should be 2000 feet.

The next question is the very practical one, How are we to get proper ventilation? "Proper ventilation," said the great authority in hygiene, Dr. Parkes, "is clean air displacing foul air constantly and steadily without chilling the patient." We are considering the question just now from the general standpoint, but shall also refer to one or two methods of ventilating the sick-room.

First let us look at one or two general principles. The inlet for the fresh air should, theoretically, be at the floor of the room. Theoretically, because the natural direction of the air-current as it becomes warm, and in the case of an occupied room, impure, is from below upwards. But practically such an inlet chills our feet, and it is better to be at a height quite above that of anyone walking about the room; or it may even be near the ceiling, where if thrown across the room the cooler air will gradually descend. The outlet, if there is no heating apparatus in the ward or room, should be at the highest part of the room, whither the heated and impure air has gone. If there is a fire on, then part of the air will make its way by the fireplace up the chimney, and part will pass up in front of the mantelpiece to the ceiling, where, unless the room happens to be lit, say by gas, it will gradually cool and descend. It must be noted that artificial heat always makes ventilation much more certain and constant.

As regards the ventilation of dwellings generally, there are three methods that may be mentioned. Ellison's bricks are bricks perforated with conical holes, the

smaller ends of which open on the outside, while on the inner side they widen out, each to about 1¼ inch in diameter. By this means the air is diffused through the room. They are usually placed behind the skirting board. Then there is the Sherringham valve. Here the air from the outside enters a box built in the wall, near the ceiling, and passes out from it into the room by a valve, which directs the air towards the ceiling, whence it falls gradually downwards. If necessary, it can be closed, as for example, if a high wind is blowing.

The third method is that by Tobin's tubes. By these the air enters from the outside, at the floor level, and passes up inside the apartment by a vertical tube, which ends about six feet from the floor, so that the cool air enters fairly clear of the heads of the inmates. An objection to these tubes is, that even though covered by a perforated plate, they are apt to become receptacles of cobwebs and dust.

When a hospital or a dwelling-house is to be built, the architect has simply to select the plan of ventilating which he thinks best; and as regards details, he has a wide choice. When we enter a sick-room, we have to make the best of what already is; and there is usually but little to choose from. For simplicity, adaptability and efficiency, there is nothing equal to the following. Get a piece of wood, about four inches broad, and of the same length as the breadth of the window sash frame. Raise the lower sash, so that the piece of wood may be fitted into the space left. In this way a current of air will be admitted between the upper and lower sash, at such a height from the floor as will not readily cause any draught. This now well-known method was recommended first by Mr. Hinckes Bird; he called it "costless ventilation."

There is another method, however, which costs less;

we only require to have windows and doors in the house. Cover the patient well with the bed-clothes, perhaps putting on an extra blanket, and drawing it up over the mouth. Then open the windows freely, top and bottom, and the doors too, unless there be any special reason to the contrary, such as the fact of the case being an infectious one, or the presence of fog outside. Close them again in five or ten minutes, but continue the extra covering on the patient till the room returns to its proper temperature, and then let him be as before. With such precautions he will not catch cold.

To turn what has been said to practical account in the way of preventing disease, we shall consider one of these diseases that are greatly fostered by overcrowding, and which flourish in the absence of sunlight and pure air. Tuberculous diseases, of which consumption is one form, cause more deaths than any other single disease in Great Britain. Of all deaths in the United Kingdom, between 25 and 35 years of age, nearly one half are due to tuberculous affections.

Consumption of the Lungs, to which we shall now confine our attention, is habitually spoken of as a hereditary affection, but it is doubtful if it is so. It is more important that everyone should understand that it is an infectious fever, just as measles or scarlet fever is ; but in place of being an occasional visitor, which almost all of us have to put up with once in a time for a limited period, the germ of consumption is constantly floating around us in countless myriads, ready to take up its permanent abode with the weak and sickly, till it proves their destruction. This small rod-like germ, or *bacillus*, so small that its length is less than half the diameter of a red blood corpuscle, is the essential cause of the disease.

We have said it is doubtful if the disease is hereditary. Some families are certainly more liable to it than others,

but that is true of the ordinary infectious fevers; it is true of all of them, probably to some extent, and of certain of them very markedly. Yet we do not say that scarlet fever, for example, is hereditary. What one inherits is, not the germ or seed, but the kind of soil that favours its growth. And it is this that is rightly called "a hereditary predisposition to consumption." It is undoubtedly a contributing cause of the highest importance, and everyone with such a predisposition should give the greatest heed to the avoidance of the secondary causes now to be mentioned. These are, dark, damp and dirty dwellings; ill-ventilated and over-crowded rooms; insufficient food and intemperance; and the infectious fevers, such as measles, whooping cough and enteric fever. All such conditions and complaints act as causes, by lowering the health and strength, and so lessening the resisting power of the system to the infecting germ.

Mode of Infection. The germ is conveyed into the system either with the dust that is floating in the air or with the food and drink, the latter most commonly in the form of unboiled milk. There are no germs in the air that is breathed out by a consumptive patient, though they are present in the air that is coughed out. A healthy person can, therefore, with safety be in close attendance on a consumptive patient, but had better not sleep in the same room.

The great source of danger is the expectoration, and the danger begins the moment the expectoration becomes dry. So long as it is moist it can only infect by contact, as, for example, by using the unwashed cup or spoon of a consumptive patient. But the dried expectoration, teeming with infecting germs, and floating about with the dust in the air, becomes a sure source of infection in a suitable soil.

Prevention of Infection.—General Measures. Sunlight and fresh air are the great sources of healthy life. They are nature's own disinfectants, and all the means that we can adopt are based on their liberal supply and free scope. These are, for example, the abundance of open spaces around our dwellings, the proper ventilation and lighting of these and of our offices and workshops to the exclusion of all close gas-lit rooms; the building of our houses on dry, well-drained sites, and seeing that they are kept dry and well aired by the methods already mentioned. Everyone should have sufficient out-door exercise, and this should be specially attended to by those whose occupation is chiefly indoors. Physical exercises, including special exercises for the lungs themselves, should be taken in moderation. Those with a tendency to consumption should particularly avoid occupations carried on in a dust-laden atmosphere. The dust irritates the bronchial passages, and if this is continued over a long period, it is apt to bring about certain permanent changes, not in the air passages alone, but in the lung tissue proper; changes in themselves bad, but which also predispose to consumption itself.

It would be well if the children of families so predisposed had all their milk heated to nearly the boiling point before using it. This precaution is a very simple one, and an effectual means of preventing infection by that medium.

Special Measures. The supervision of the milk supply is one of these measures which sanitary authorities look forward to having under State control. For until we can ensure the purity of our milk supply we can never be certain that we are not having around us many preventible cases of consumption. Such control would include the registration and supervision of all byres and dairies, the isolation of all animals infected with con-

sumption, the supervision of slaughter-houses, and the systematic inspection of cattle before and after slaughter.

But the most special measures of all, and a matter that is attracting, and rightly attracting, the greatest attention at the present day are the precautions that must be taken by the consumptive himself. These may be stated briefly as follows :—

He must not expectorate about the house, or even out-of-doors. Not to speak of spitting on, or from, a tramcar or in a railway carriage, or on the pavement, he must not spit upon the street. Indoors he should use a little cup or special vessel, containing a watery solution of carbolic acid (1 part to 20); out-of-doors he should have a pocket spittoon or a small wide-mouthed bottle with a cork. Once a day the collected expectoration must be burned on the back of the fire ; if there is no fire, it must be well washed down the water-closet or buried in the earth. The cup or spittoon must then be carefully washed with boiling water. If the consumptive has no proper vessel, he must spit into a piece of rag or paper, which can then be burned. The patient should never swallow the spit : if he does so he may re-infect himself, that is, the stomach or bowels. The mouth should not be wiped with a handkerchief, but with a piece of rag or paper, which can be burned. A consumptive person should not kiss anyone, and a consumptive mother should not nurse her child.

There are further special precautions that the nurse must attend to. She must see that handkerchiefs, if any, and the personal and bed linen of the patient, are thoroughly disinfected by scalding before being sent to the laundry. She will also see that the bedroom is carefully cleaned every morning with a damp cloth, so as to avoid raising the dust, and that, for a similar reason, an abundance of tea leaves are used in sweeping the carpet. The

dusters must be boiled and the tea leaves burned. The nurse will probably be directed to admit as much air, and certainly as much sunlight, into the room as can be had; and whatever diet is ordered she should know that as a general principle fat in any form that the patient can relish and assimilate is an excellent thing.

Rooms that have been occupied by consumptives should be white-washed, painted, and papered before being used again.

CHAPTER VIII.

Food—How Classified—A Mixed and a Varied Diet Essential—Food for Growth—Beverages—Water: its Natural Source—Daily Allowances—Water Supply—House Refuse and Drainage.

Food fulfils these three great objects; it supplies the body with heat, with energy and with tissue. In other words, by food the temperature of the body is maintained, the force for doing work is supplied, and the loss by wear and tear in doing that work is made good. It is habitually likened to the coal which heats the boiler and makes the engine go. But food does more than that. It supplies the material of which its own boiler and engine were built, and once built it keeps them in working order a whole lifetime. Fulfilling these great and widely different purposes, it is obvious that food collectively must be a very complex thing; and when one thinks of the infinite variety in which it is presented to us by nature, one is inclined to doubt if any simple scientific classification of food is possible. Yet it can be classed and so far described under terms that require only a slight knowledge of chemistry to be understood, and which meantime may be at least kept in mind even by those who have not yet that special knowledge.

Food in the ordinary sense of the term is derived entirely from the organic world. But as water and certain mineral salts are strictly reckoned as food,

inorganic substances are to this extent represented. The organic substances from which our food is derived are divided into two great classes, the nitrogenous and the non-nitrogenous.

The nitrogenous group constitute a great class by themselves. They are so called because, in addition to carbon, hydrogen, and oxygen, they contain nitrogen. Sulphur and phosphorus also enter into their composition. This group is sometimes called the fibrinous, which helps one to remember that it is largely represented by the fibrin or lean of meat, but more frequently it is spoken of as consisting of the *albuminates*, including as it does all foods which contain albumen. Of these, the white of egg is the best known example, but in milk there is the casein, or cheese ; and in the lean of meat there is syntonin ; in flour, gluten ; and in peas, legumin—all albuminates. Their function is tissue-forming. They form muscle, and supply generally what is lost by bodily wear and tear. The other great group, the non-nitrogenous, is further divided into two distinct sub-classes, the fats and the sugars or starches.

The Fats. These include the animal fats, such as butter, suet, and dripping, and all the vegetable oils. Chemically they are made up of carbon, hydrogen, and oxygen, the proportion of oxygen being insufficient to form water along with the hydrogen. They are the great heat-producing constituents of food. They are instinctively taken in larger quantities in winter than in summer, and they constitute the great proportion of the food in northern regions. The fats contribute also to the energy of the body.

The Sugars or Starches. This group includes not alone the ordinary forms of sugar, but the closely-allied starchy constituents of food which are very readily changed into sugar. They are in effect the same, for the change begins

whenever the food enters the mouth, and all the starches are completely converted into sugar before they are absorbed by the tissues. They are chemically described as carbo-hydrates, because along with the carbon of which they are composed there are hydrogen and oxygen in the proportion to form water. They constitute the greater part of vegetable foods, such as roots, grains, and fruits. Besides the various vegetable sugars, we have milk sugar obtained from the animal kindom. The carbo-hydrates, like the fats, are concerned in the production of heat, and seem also to be the chief source of the energy of the body.

In addition to what is included in the foregoing groups, there are various vegetable acids and inorganic salts in food. And lastly, there is water, which enters largely into the composition of solid food, some vegetables such as turnips consisting chiefly of water. But water must also be taken separately as a drink. It is required for the dissolving of the solid foods in the alimentary canal; and it carries off in solution a great part of the waste products of the body. All this may be a little difficult to follow, but it represents vital truths that cannot very well be more simply expressed.

Most of the natural foods have all these different constituents above grouped in their composition, but no one article of food has each group represented exactly in the proportion best suited for general purposes. And certainly we could not live on food taken from any one of these groups alone, however great a variety of articles of diet we might select from it. We might try, for example, to live on the lean of meat, the white of egg, gluten bread and cheese, which all belong to the nitrogenous group, but however daintily and variedly cooked they might be, they would not long sustain life. It is interesting on the other hand to know that some kinds of diet which appear to be of the simplest, as they are indeed

of the lightest character, really contain all the essential principles referred to. One might live, for example, on milk alone. It is not just the kind of food that one engaged in active work would select; still it would sustain a life of comparative quiet. In it the fibrinous principles are represented by the casein of milk which we use in the form of cheese; the fatty by the cream or butter, the saccharine by the sugar of milk, which can easily be separated from it; and then there is naturally, not to say artificially sometimes, a large proportion of water, fully 85 per cent., with some salts in solution.

We see, then, that as regards the different principles of which food is composed, man's diet, to maintain health properly, must be a mixed diet. And in what is understood as a simple or natural life man will be found instinctively adopting this mixed diet though he fare on the plainest food. When he makes his breakfast of oatmeal porridge he has his flesh-forming albuminates in plenty though not in such abundance as he would have were he dieting on meat itself. The fats will be well represented, and the carbo-hydrates, of which meat has none at all, will be in large proportion. There will be also the necessary amount of mineral salts. If he has good milk in addition, he has these four principles again in another form; and he has, besides, all the fluid he needs to begin his work. If he adds to this, it will probably be a slice or two of bread and butter, the butter being especially welcome, because it completes his required amount of fat, in which principle the bread itself is rather deficient. If for dinner he should get no meat but gets in its stead bread and butter once more, and potatoes, cheese, and milk, we may be quite certain that if he has worked for his meal he will relish it. We do not mean to say for a moment that one should confine one's self to so simple a diet as this. We have only to look around at the great

diversity of form in which nature supplies us with food to feel certain that, while in the homeliest fare she provides us with all we really need, she means us upon occasion to avail ourselves of her varied gifts. Experience, indeed, shows that variety in food is essential to good digestion and good health. A sameness in our diet is depressing to both body and mind.

As to the proportion of these principles and the total amount of food that a man requires daily, that will depend on many circumstances, such as the age and build of the individual and the amount and character of his work. But it is reckoned that an average water-free diet for an adult should contain 5 ounces of nitrogenous food, 3 ounces of fat, 15 ounces of carbo-hydrates, and 1 ounce of salts ; in all 24 ounces.[1] But as the total amount of water in these foods will average as much more, we must allow a total weight of actual food each day of 48 ounces. And very much more water than this must be drunk to make up the amount ordinarily required. The actual quantity will vary very greatly according to the temperature and moisture of the atmosphere, and the amount of the man's work.

A man must, as we have said, have variety. The common produce of a country will supply his wants in the first instance, but the kind of animal food and its mode of cooking should be varied ; and particularly all should avail themselves of the great variety of vegetable food that is nowadays brought into our markets. Authorities are agreed that we all take too much animal food. This has been alleged and with truth of England for centuries, and it is true of Scotland now. In the

[1] A total of some 6 ounces less would suffice for a man resting, while about 5 ounces more is needed for one engaged in very hard work. The increase would be chiefly in the albuminates and fats.

olden times, when everyone had to catch his hare before he cooked and ate it, it was a different matter, but now when the hare is brought to our door, we should take less of him. If we say that this over-indulgence in animal food is to-day true of our well-to-do working-class population, we except the head of the house with his hours of honest labour. But his family take too much butcher meat, particularly the women-folk and the children, who would be better with a fuller vegetable diet. We all know that this applies in an infinitely greater degree to the wealthy and leisured classes, who too often live to eat, and eating, make themselves ill.

Arrangement of Meals. If it is impossible to set a number of fixed hours for the various meals that will suit everyone, there are at least one or two sound principles that everyone should keep before himself in arranging his own times for taking food. It must be noted first of all that the stomach, like every organ of the body, must have its period of rest, however short. A man in good average health should allow four-and-a-half hours between his meals. That will give the stomach at least half-an-hour's rest. As a matter of fact he will, after such an interval, be really ready for his next meal. Younger and not so robust people should have lighter and more quickly digested food and at shorter intervals; they can have four meals a day. One hour should always be allowed for meal time, so that none need sit down to food feeling exhausted, or rise from it to resume work at once. The evil of bolting one's food has been referred to in a previous chapter. It is well that the last meal of the day be always taken at such an hour as will admit of its complete digestion before bedtime, so that all the organs of the body may rest together.

Food in Reference to Age. The food of infants and the very young will be dealt with in the next chapter

"Concerning the suitable kinds of food for youth," says Dr. Dukes, who is eminently qualified to speak on this subject, "I would insist that meat should be provided twice a day, at breakfast and at dinner; that the crust of bread is more suitable than the crumb, and whole meal than white bread; that porridge is an invaluable article of diet; that sugar, so frequently denied, is an indispensable requirement, forming as it does their main heat-forming food, as well as the most important factor in the growth and work of muscles; that milk should take the place of tea and coffee, and that young people are better without alcohol."[1]

The fondness that children have for sugar is so universal that it may be accepted as a natural instinct which it is safe to follow. The carbo-hydrates in this form must be best adapted to supply the heat and energy that are being constantly expended in their restless activity. Sweets may be a contributing, but they are not an essential cause of bad teeth, for black children also are fond of sugar, and their teeth are excellent. On the other hand, it must be confessed that the children of our own country do not take kindly to the national, and for them the natural dish of oatmeal porridge. We are certain of two reasons for this. Oatmeal porridge as usually prepared is a rather stimulating diet; it exerts a healthy stimulus upon the healthy stomach and bowel-wall of the adult; but such a stimulus is to the child an irritant, and the younger the child the greater the irritant. And nature is only true to herself in thus guiding the child meantime away from it. Then again, it is an article of food which is apt to be carelessly prepared, almost certainly so if our cook is a superior person, and considers porridge vulgar; and if it has been the custom to send it to the table insufficiently boiled, or with the

[1] T. Clifford Allbutt's *Syst. of Med.*, i. p. 466.

dispersion of a few lumps in it morning after morning, the older child who might now be taking it with advantage has already turned from it with an only too persistent aversion. But if children were given from the first porridge made from the finest and best oatmeal, well boiled and carefully cooked, perhaps made with milk for a time, they would never tire of it.

We have in a previous chapter referred to the diet of invalids, its preparation and administration. What we have said in that connection about the cooking of food must suffice for the present. The diseases arising from the insufficient and injudicious feeding of young children have also been described.

Beverages. As has been already pointed out, there is a large proportion of water in what is termed solid food, but notwithstanding this, man needs a considerable quantity of water in addition. Two or three pints more as a daily average we might say, but the amount will vary greatly according to the weather and the man's work.

Tea, coffee, and cocoa are the three common non-alcoholic beverages. The two former are stimulants alone and not foods; the last is little of a stimulant, but has some value as a food. They all contain active principles, very closely related to one another, to which they owe their strength. Tea and coffee are valuable stimulants and act without causing subsequent depression. But they can be, and often are, abused. They can call out the tardy energies of the system to digest a meal or dispel for the time a feeling of weariedness that may or may not be that of real fatigue. But they can never take the place of food; and if habitually over-indulged in they will sooner or later bring about a weakened digestion, sleeplessness, and bad health. Tea should be made by placing the dry tea in a well-heated teapot and pouring

over it fresh water which has been just brought to the boiling point: the infusion should stand for only three or four minutes and then put into another teapot which has been previously heated. If infused longer, the tannin is extracted from the leaves, and the infusion becomes astringent and indigestible. Coffee should be freshly roasted and ground in order completely to bring out its pleasant aroma. It should then be placed in a suitable vessel on the hob till both are thoroughly warmed. Boiling water is now to be poured over it and the infusion allowed to stand for ten minutes. Coffee should not be boiled; if it is, much of the aroma is lost. Cocoa is a true food as it contains a large amount of fat and a considerable quantity of nitrogenous and starchy matter. As the fat of cocoa is rather indigestible, about one half is often extracted from the crude cocoa, which makes a lighter and still most nutritious product.

Alcohol. There is no need to describe here the different alcoholic beverages They have undoubtedly their place in nature, for alcohol is the result of a natural process, namely, fermentation. As regards the human economy, we believe the purpose of alcohol is to call out latent energy for the special emergency. In one or other form alcohol may carry us over a crisis in disease, or spur for a little the feeble appetite to digest what might otherwise be rejected. But when we say that it cannot do this for any lengthened period, that the stimulation is always followed by depression, and that alcohol is in no proper sense of the word a food, we only state the opinion generally held by medical men at the present day. No healthy man under ordinary conditions need ever touch it, and we have never known anyone who has adopted such a course of abstinence regret having done so. In a certain proportion of people the appetite for it readily develops into an overmastering desire; and in sickly

children this craving may be apparent as soon as the patient has the intelligence to clutch the glass with the hand. And such a calamity cannot be forestalled unless a hereditary predisposition is anticipated. Alcohol is the possible cause of disease in any organ or tissue of the body, disease which in its acuter forms is an open shame, and in its slower and more hidden forms is a relentless enemy to the end. Children should never be given it except by the doctor's directions; the young are better without it, and the adult, if he thinks he needs it, should take it only with meals.

Water. We have still to consider the nature and sources of water, and the use to which it is put by the community. Chemically pure water, composed of 2 parts of hydrogen and 1 of oxygen, hardly occurs naturally. It is a clear, tasteless, odourless liquid, and is also colourless except in considerable bulk. It is always found aerated, that is, with a certain amount of atmospheric air in solution.

Water is the most universal solvent known; nothing therefore so readily becomes impure as water. It can hold in solution a great number of solid substances; indeed there are few solids which do not sooner or later become dissolved in it. What it does not dissolve quickly it may hold *in suspension*, that is, floating about in it. Water dissolves or retains all gases. For these reasons it will be readily understood that the natural sources of water which we shall notice first, have to be considered primarily from the standpoint of purity.

Rain water, the source of all the other supplies, is almost pure if collected in regions remote from human habitation; and rain water collected anywhere after a period of heavy rain is purer than at other times, because the air has been already well washed. In or near towns it is impure, but rain water being always "soft" water, is

suitable for washing or cooking purposes. Surface water (streams, ponds, etc.), unless quite away from dwellings and cultivated lands, is likely to contain organic impurities, and may readily become, as we have seen in a previous chapter, a medium for certain infections. Ground or subsoil water is got in shallow wells. It also is apt to be polluted, for example, by manure heaps or cesspools; but if the water has passed through uncultivated soil, or if the well is at a higher level than any dwelling near, the water may be very good. Deep wells, if by that we mean wells sunk not only through the subsoil, but through the underlying impervious layer of rock to a still deeper porous layer, are almost certain to yield an excellent drinking water. Any organic matter originally present will most likely have been destroyed by oxidation in passing through the greater depth of soil. But their water is liable to become polluted if the sides of the well are not properly cemented. Spring water is also, as a rule, excellent. Here probably an impervious layer of rock, on which the underground water lies, has come to the surface and carried the water out, very likely on the side of a hill. This water, and that from a deep well, will be more or less "hard."

The hardness of water depends chiefly on the presence of carbonates and sulphates of lime and magnesia. By boiling the water the carbonate of lime is made to precipitate, when it forms an injurious crust on the sides of the boiler or kettle. Carbonate of lime is the cause of "*temporary*" hardness. "*Permanent*" hardness is due to salts not affected by boiling, chiefly the sulphate of lime. These salts in hard water form a curdy insoluble mixture with soap, and the water will not lather, that is, become soft, till these salts are thus removed. Such water causes, therefore, a great waste of soap.

Daily Allowance for each Person. One has to remember

here the many uses to which water is put. It is required not alone for drinking, cooking, and personal washing, but for washing clothes, dishes, and houses ; for cleansing closets, sewers, and streets; for many trades, and so on. For all these purposes it is estimated that there should be an average allowance to each person of at least 30 gallons a day, of which $\frac{3}{4}$ of a gallon will suffice for cooking, about $\frac{1}{4}$ for drinking, and 5 gallons for the daily bath.

Water Supply. At the present day the water supply of towns and villages is almost always under public control, so that the risks of an impure or inadequate supply have become greatly lessened. But there are still left some important points for individual attention. Drinking water should always be obtained direct from the main. Even then it is advisable to let a gallon or more run off in the morning (particularly if it is a soft water, as that most readily absorbs lead), so that the water which has been lying overnight in the lead pipes of the house may not be used, but that which comes from the main pipe in the street. Water for drinking is still sometimes drawn from a cistern in the house, but such water is neither so safe nor so pleasant to drink as the other. Cisterns are often placed in dark, unwholesome situations, so that the water becomes dirty or impure, particularly if the cistern is placed within the water-closet, or if the overflow pipe is directly connected with the soil-pipe, which carries the discharges to the drain, or with the drain itself. If a house cistern is used it should be of galvanised iron, and not of lead. It should be covered in, yet well ventilated, and should be easily got at, in order to be cleaned twice a year. The overflow pipe should end in the open air, so that any overflow, and therefore any waste of water can be readily seen. A water-closet should never be supplied directly from the main cistern, but should have a small flushing cistern, holding about two gallons of water, for

itself: this cistern, however, may be supplied from the main cistern.

Purification of Water. For all practical purposes the boiling of an infected water for a few minutes renders it perfectly harmless: the germs of disease are killed, and the water is said to be *sterilised*. Boiled water seems tasteless or insipid on account of the air having been driven out of it, but it can be partly aerated again by pouring it from one jug to another several times. It is something worth knowing that one could pass unscathed through hordes of cholera patients if all one's solid food were thoroughly cooked, all the drinking water boiled, and the plates and other utensils washed with boiling water. For, like enteric fever, cholera is communicated by the discharges from the patient.

Into the question of the purification of water by filtering we need hardly enter. It is done on a large scale by passing the water through sand and gravel of varying coarseness, which material must be regularly renewed. Domestic filters are made on the same principle. They need continual attention to prevent them becoming an additional danger, in place of a protection; and they should therefore be so made that they can be readily taken down and easily cleaned.

Domestic Refuse and Drainage. Like the water supply, the disposal of the domestic refuse of towns and villages is usually under the control of the public authorities. We need here refer to the matter only very briefly. The refuse of the house may be classified as, 1, Dry refuse, such as ashes, cinders, dust and rubbish generally; 2, Liquid refuse, such as household slops and kitchen waste water; and 3, Excretal refuse, being the discharges from the human body, solid and fluid. How best to deal with this "sewage" in towns and villages, is one of the great problems of sanitary science. Such

refuse has only one natural purpose, and that is to fertilise the ground. The waste of the animal kingdom is the food of the vegetable kingdom. This is a great fundamental law of nature; and, if this waste is not speedily received again into mother earth, it becomes an offence and danger to mankind.

Its removal by sewer and river, to the sea, is the most unnatural of all methods of disposal, a method that could only have arisen from the, in a sense, unnatural massing together of human beings in large cities. Meanwhile this is the prevailing method. By a sufficient flushing with water, the refuse is carried by the soil pipe into the drain, thence into the street sewer, and finally into the river or the sea. Simple enough this method of disposal appears to be, yet it may be a source of great danger to the community. For this refuse will, as we have said, quickly putrify, and give off gases which are unhealthy, if not positively poisonous. Termed collectively "sewer gas," it forms and remains in the drains and sewers, and is always liable to make its way back into the house, especially whenever an additional discharge of refuse takes place. To prevent this, the house drain, and indeed every waste pipe, should be "trapped." There are many forms of these traps, but they all depend upon the constant presence of a body of water, called the "water seal," at some fixed point within the waste pipe or the drain, so that while refuse can pass freely onwards, there will always be a certain amount of water left that will prevent the gas making its way back into the house. The syphon trap is one of the best, and is formed by a bend in the pipe, generally of a U or an S shape. There are certain precautions and risks connected with all such protective measures, but the consideration of these, and any detailed account of house sanitation are beyond the scope of the present work.

As to the general refuse of the house, it may all be put into the dustbin, if the contents of that are removed by carts daily, or almost daily. Otherwise, animal and vegetable scraps should be burned at the back of the kitchen fire; and only dust, ashes and dry rubbish put into the dustbin. This should be covered, and kept at a little distance from the house, ready for its contents to be removed.

CHAPTER IX.

Personal Health—Cleanliness—Clothing—Exercise and Rest—Smoking—Regular Living—The Hygiene of Infancy: Food—Cleanliness—Clothing.

We have been considering mainly the surroundings of the individual and how they affect him; we have still to speak more particularly of the care of the individual himself. It is not all a question of bad air or water, or of an attack of the germs of this disease or that. What of the constitution on which the attack is made? What of the soil on which the seed is sown?

No two constitutions are alike. Some seem to resist all attacks; others seem to make no resistance whatever. But all need looking after, the weakest most of all. A man cannot make himself other than he is, but he can make the best of himself such as he is; and nothing less than this is his duty both to himself and to those who will come after him.

Cleanliness. The first consideration in the care of the person is cleanliness. That can hardly be gainsaid, and we may infer its importance from the abundance and fitness of the medium which nature supplies for that purpose. As a matter of fact, air and water supply our most vital wants.

We have only to consider the wonderful and complex function of the skin to see how much it deserves our care

and attention. It has to protect the delicate underlying structures of the body, and yet itself be sensitive to the most delicate touch. We breathe out from its surface much of the carbonic acid that is set free within the body; and from its million pores a large proportion of the waste water of the tissues escapes in the form either of vapour or of sweat. And in addition it supplies for itself the fatty substance by which it is protected from the weather and kept soft and pliable. As for cleanliness, nature is no doubt sufficient for herself even to keeping the skin clean. The used-up scarf skin is rubbed and thrown off, and fresh layers come forward to take the place of those that are worn out. The oily secretion which has done its work will cake on the old skin and be thrown off along with it, the pores will be kept free by the constant insensible perspiration, and every now and again they will be more thoroughly flushed out by the abundant sweat that some active exercise has caused. But nature won't wash clothes, and our clothing itself prevents her carrying out efficiently on the skin those cleansing methods of hers to which we have just referred. People who wear clothes are expected to attend to them, and to their skins as well; and if they do not, nature will retaliate by making them foul and offensive to their wiser and more orderly neighbour. And so something has to be done.

Water alone will not suffice to remove the oily waste of the skin, with which is mingled the dusty particles from a more or less polluted atmosphere. Soap, however, which is formed by the combination of an alkali with some fatty acid, does this, in a way perhaps not altogether understood; but the alkali dissolves the organic waste of the skin, while the fat assists in washing this off. It also prevents the alkali from overdoing its part, and so leaving the skin dry, and liable to be chapped from

exposure. Coarse soaps, indeed, which contain an excess of alkali, are very apt to do this with any one, and people with delicate skins, and young children, should use superfatted soaps which contain no free alkali.

Warm water is more cleansing than cold. It is softer, and mixes better with the waste material of the skin, and also with the soap itself. A complete bath of warm water and soap should be taken at least once a week ; and if the skin is well rubbed with the hand, just as the soap is about completely off, a further quantity of scarf skin will separate, and at the same time a healthy glow of the surface will be produced. This will be completed by a good rub down with a rough bath towel. A warm bath, which is always more or less relaxing, should be taken just before going to bed.

The cold bath is less cleansing than the warm bath, but is refreshing and invigorating. It should be taken on rising in the morning. Anyone in good health can have a cold bath, and it increases the resistance of the body to chills and winter colds. The immediate test of its efficacy is a good *reaction*, as the glow of heat which follows it is termed. If the reaction is imperfect, the bath has either been too long continued, or the water has been too cold. A few seconds in the bath will always suffice to get the desired result, and in winter most people will require to have the chill taken off the water. If, notwithstanding this, the reaction is imperfect, still more, if there is actual chilliness produced, then that kind of bath must, for the time, be given up. But a rapid cold sponging can be tried, the person standing the while in a bath in which there has been put a little warm water. And anyone not actually an invalid, can, after the morning wash, sponge the neck, side of head and chest with cold water, which will itself greatly strengthen the parts against cold.

The hot bath (105° Fah. or a little more) is very agreeable after exertion. It is soothing to the wearied muscles, or to parts that may be chafed; and by removing from the skin the waste products of exertion it allays the feeling of fatigue. But it must be remembered that a hot complete bath is very relaxing, and after ten minutes or so begins to be powerfully depressing, even to the most robust.

The hands should always be washed before meals, and the feet should be washed frequently. The wearing of boots interferes considerably with the escape of perspiration and the shedding of the dead scales of skin, particularly between the toes.

The hair should be well brushed at least night and morning, and the head washed about once a fortnight. For this purpose there is nothing better than soap and water, if afterwards the hair is well rinsed in pure, soft water. In the case of children the hair should be kept rather short, and the head washed once or twice a week. The teeth should be brushed outside and inside night and morning, at night especially, with a brush that is not too hard; and if the mouth is well washed out before going to bed with a little tepid water, in which has been put a pinch of borax, it will be all the better for the teeth.

Clothing comes naturally next under consideration because of the almost universal neglect of cleanliness as to the clothing by those to whom appearances are a matter of secondary or of no importance. But if clothing imposes, as we have seen, the necessity of additional attention to the skin, how great an offence must dirty clothing itself be.

In our changeable climate great attention must be paid to the character of our clothing. We get rain in abundance from the south-west, alternating with bitterly cold

winds from the opposite direction, with occasionally some hot weather thrown in between; and it is just these atmospheric changes that are particularly trying to the constitution. Then our people, as a whole, work hard, and the cooling down process is fraught with many dangers. There is no doubt that within the body some of the products of active exercise favour the development of rheumatism; and if the throwing off by the skin of these wastes is checked in any way serious results are apt to follow. It is not a wetting that is alone the cause. Exertion on a hot day, with subsequent cooling down at rest in the open air, or, worse still, in a draught, is probably as effectual a means of getting rheumatism as one could wish to avoid.

The clothing should be loose and easy, so as to admit of free movement of all parts of the body. Compression of the chest restricts the movements of respiration, and associated with the prevalent girdling of the waist displaces all the abdominal organs. Constriction of a limb interferes with muscular action, and particularly with the circulation of the blood of the part, and therefore of the whole body. On the other hand, loose easy clothing is not only free from these faults but is warmer, just as coarse flannel is warmer than fine. The reason is that the loose folds of the clothing and the wider spaces of the coarser flannel contain more air, and air is a bad conductor of heat. In other words, air mingled with such a material as fur or feather will not conduct the heat of the body away, and so is warm. That is why a bird, if it feels cold or wishes to be particularly warm, fluffs out its feathers; and anyone can satisfy himself of the truth of the principle by letting his clothes hang loosely about him, when he will feel warmer than if he draws them tightly round his body.

Of all materials for clothing wool is, next to fur, the warmest. But it has another property which makes it the

best material for underclothing in all weathers and seasons. It not only prevents the escape of heat from the body in cold weather, but in warm weather it absorbs and then retains the perspiration for a considerable time, only allowing it to escape slowly and thereby preventing a chill.

Cotton, again, and still more linen, present exactly the opposite qualities, and are therefore not suitable for wearing next the skin at any time. But white outer garments of light weight are best adapted for summer weather, as white materials throw off the heat, while dark ones allow it to pass through. The popular impression that black clothes are the coldest in winter and the warmest in summer is therefore perfectly correct. They let the heat pass out when it is all needed, and pass in when it is not wanted.

Fur undoubtedly makes the warmest clothing of all, and has always been in great use in northern regions. But it is not a very suitable garment for active exercise as the skin of the fur retains the perspiration of the wearer. One does not need to be told that the rough Scotch tweed and the Highland plaid afford the best protection against a cold wind. They have met all the demands of our climate in the past, which is saying a good deal. Waterproof, however, true to its name, is not a suitable covering for working in or even for walking in, as it also retains the perspiration of the body. But if well ventilated it is the best protection we can have against rain in driving or standing, and has the great advantage of not absorbing the rain and so being difficult to dry, as are the rough warm materials just referred to.

We have already said that the clothing should be loose and easy, so as to admit of the free movement of the body and avoid the risk of any interference with important internal organs. That is sufficient for those who

are open to accept advice which is professedly scientific and not fashionable; but meantime fashion holds undisputed sway.

For old and young, boots should be made of good oak-tanned leather, which absorbs the perspiration of the foot and allows it to escape to a greater degree than any similar material. Cheap leathers, rapidly prepared by certain chemical processes, by retaining the perspiration of the feet are both uncomfortable and unhealthy. This also applies to patent leather. For light summer wear shoes are best, as they afford the most thorough ventilation. Stronger boots are best adapted for rough walking. In all cases the heels should be low, the arch of the foot well supported, and sufficient room given to the front of the foot and toes. For general use, and in the case of children always, the stockings should be of wool; and if ribbed, they afford a freer ventilation to the foot than if plain. It is better to use 'suspenders' than garters, which are apt to interfere with the circulation, and so favour the development of varicose veins.

Exercise and Rest. They are equally essential to the maintenance of healthy life. They are inseparable in the animal economy; they are associated throughout one's whole existence. It is not the brain and the muscles alone that have their periods of exercise and rest, but the heart also that we are apt to imagine cannot take time to rest. For every heart beat is followed by its period of repose, and if we total these all up we find, curiously enough, that the heart rests off and on about eight hours in the twenty-four. Amongst the leisured class, perhaps the stomach gets the least rest of all the organs, so that it is not for nothing that it protests so much.

When we said that exercise and rest are inseparable, we meant in actual life: but they are also essentially inseparable. The one is impossible without the other.

It is as true that we cannot go on resting if we do not sometimes work, as it is that we cannot go on working if we do not sometimes rest. The former is being attempted every day, but without success. Such resting becomes 'loafing,' a very different thing; this in turn becomes worrying, and what finally, no one can tell. It is the alternation then of the one with the other that makes both of them a positive benefit and pleasure. Some like a long spell of work followed by a good long holiday; others prefer short periods of each. Both are equally good; it is a matter of temperament.

Again, the alternative must also be a contrast. A man who has had hard physical indoor work will find his rest lying on the hillside or by the sea; if his work is similar, but outdoor, he will rest at home. On the other hand, to the man who has had a strain of mental study upon him, his rest will be a round at golf, or a run into the country in his motor car or on his cycle.

As to sleep, different constitutions undoubtedly require it in different amounts. The man of a nervous, highly-strung temperament needs more; the placid, easy-going individual requires less. No fixed duration in hours can be stated for one and all. But if a man wishes to find out how long he should sleep, he can follow John Wesley's advice, which was to rise half-an-hour earlier every morning until he found that he slept whenever he lay down in bed, and only awoke when it was time to get up. A child requires some ten or twelve hours' sleep, a woman eight hours, and a man about seven.

Smoking. Rest after toil, and, in nine cases out of ten, a smoke. We do not think that the habit of smoking can be uncompromisingly condemned. A large proportion of sensible, intelligent men are quite convinced that smoking, as they practise it, is an unalloyed pleasure and an undoubted promoter of both mental and physical

well-being. On the other hand, it can hardly be disputed that to those who only acquire the habit after much painful effort and heartburning, it will always be to some degree harmful, and that its subsequent toleration only illustrates the wonderful adaptability of the human organism to the constant and the inevitable. To many men the practice is undoubtedly hurtful. It makes them pale, languid, dyspeptic, and nervous, the nervous control of the heart being specially liable to suffer. The smoker's sore throat is a recognised malady, and the great Scotch oculist, Dr. Mackenzie, referring to the effects of smoking upon the eye, and also to the tyranny of the habit itself, was accustomed to say that "some men would rather smoke than see."

But in the case of boys, the evil effects of smoking are beyond all question. We would deal fairly with them and say, that if they wait till they are at least eighteen or twenty, they can then judge for themselves whether or not the game is worth the candle. For, in the face of common experience, no one is entitled to say, that to every grown up man, *i.e.* above twenty-four years, smoking is certainly injurious. But to boys and young lads, the practice is utterly and incontestably bad. Tobacco acts strongly upon the susceptible nervous system of the young. It seriously affects the action of the heart, and the constitution of the blood; and that it, and no other, is the cause, is proved absolutely by the fact that, when the practice is stopped—if stopped in time—the symptoms of disease disappear. If not stopped in time, and to any but the most vigorous boy the time cannot be long, a long period of impaired health will result, or perhaps some structural disease will be produced, from which there is no recovery.

Regular Living. By that one may mean the definite recurrence of the various functions of the body, the

orderly return of the different elements of our daily routine ; or one may mean moderation in all things, the avoidance of extremes. In both senses regular living has an intimate connection with good health. It *is* good health. When we are well the unconscious processes of what is called animal life pursue their course with orderly repetition, and we call this the *normal* state ; and normal means exactly regular. We should imitate these unconscious processes, these respirations and pulse beats, and be orderly and regular in all those things which come under our control.

In the other sense, that of moderation, or the avoidance of extremes, it is equally true to say that regular living is health. The animal economy is never extreme, never turns from the even tenor of its way, except when it has to defend itself. We have seen that the temperature of the body is always the same, except when an attack has to be repelled. We had almost said we should be like our normal temperature, but our life can hardly be so uniform, so regular, as that ; but the illustration serves to point the moral. Avoid extremes. The middle course is proverbially the safest. The extremist has his uses, but he is meant to be, and must be, the exception. Let us be of the rule, regular.

The Hygiene of Infancy. A few words in conclusion to those who rock the cradle. It has been stated anonymously that, in this country at least, "young mothers as a rule, have neither the instinct nor the knowledge how properly to care for their young children." It is at least true that much can be learned from the instinctive methods of the lower animals. They invariably adopt the natural method of feeding their young, and they take the greatest care to keep their offspring scrupulously clean. And nature herself, who looks after the clothing, is careful that it is neither scanty, cumbersome, confining,

nor elaborately ornamental. In all these respects the human mother has much to learn.

If the mother is healthy she should nurse her child herself, and from the first accustom it to be fed at regular intervals. For example, under 3 months of age every 2 hours, between 3 and 4 months every 2½ hours, and between 4 and 6 months every 3 to 3½ hours, and so on, gradually lengthening the interval as the child becomes older and stronger. Usually at 7 months old the front teeth give warning that the time for beginning to wean the child has come. But as regards the night time the intervals can be much longer. Most infants had better be fed once, or even twice, during the night, but some vigorous children can be trained almost from the first to sleep in their own cot without expressing any very clamant protest. An infant is not necessarily hungry when it cries. As Dr. Combe says, "if it is overfed, it cries; if it suffers from the prick of a pin, it cries; if it lies too long in the same position, so as to receive undue pressure on any one part, it cries; if it is exposed to cold, or any part of its dress is too tight, or if it is held in an awkward position, or is exposed to too bright a light or too loud a sound, it can only express its discomfort by its cries; and yet the one remedy is, not to find out the true cause of offence, but to offer the child the breast!"

If a child cannot be fed naturally, then for the first six weeks or so it should get a mixture of cow's milk and water, about equal parts, at a temperature of 98° or 100° Fah., the heat being obtained by putting the bottle containing the mixture into hot water. A little sugar of milk, which can be got at the chemist's, or pounded lump sugar, may be added. The best feeding bottle is the one that is simplest, and with the least amount of tubing; for above all things, it must be easily cleaned. Any milk over should be thrown away, and the feeding bottle

scalded and dried. It is best *kept* clean by keeping it in cold water.

A child should get absolutely no farinaceous food for the first three or four months, for nature at that period has made no provision for the digestion of starchy principles. When seven or eight months old the process of weaning should be begun by giving the child two meals a day of some farinaceous food. Entire wheaten flour (which apparently constitutes the bulk of most of the infant foods), or rusk added to a cupful of warm milk, may be given; and a few weeks later a little well-made thin oatmeal porridge boiled with milk. After the first year weak mutton broth freed from fat, a soft boiled egg, or some light pudding, are examples of a suitable diet. A child should not be given something to eat whenever it cries for it. To quote Dr. Combe again: "A child will cry, not because it really stands in need of nourishment, but because it must be doing something."

Cleanliness. Once a day, at least, a child should be washed all over with warm water and soap; this should be done in front of the fire, while the child is well protected from the draught. The skin must be afterwards made thoroughly dry with a soft towel, gently used; and only when thoroughly dry some dusting powder of finely-powdered starch may be applied to the parts which are tender and liable to chafing. Fresh water and a special sponge should be used in washing the face, or in some cases kept for the eyes alone which in an infant are easily inflamed. The napkins can be made of any cotton material, but not of linen. They should be changed frequently, and the parts washed and dried as above described.

Clothing. This should be soft and warm and loosely put on. We have seen that loose clothing keeps in the heat better, and the infant needs all the heat it has, and

more. We say more; and the proper place, at least at night, for the young infant however strong, is in bed by its mother's side. The so-called hardening process, whatever its general merits may be, is altogether out of place during the early period of infancy. Further, the clothing should be loose, in order that the child may have perfect freedom of movement, of the limbs especially. A healthy child delights to catch and kick; these are nature's physical exercises for the time being.

If infants, after all, are as a rule warmly clad, and indeed, if at all sickly, overclad, there is a tendency on the part of some to under-clothe their children of two or three years of age. No hard-and-fast rule can be laid down; but, speaking generally, the young should be warmly clad just because they are young. No doubt the hardy child may be made less hardy by being overclad, but the less vigorous child may be made so hardy by scanty clothing that he is hardened out of existence altogether. Nature's attitude towards children is one of protection in clothing as in everything else. The great principle to guide one's conduct in this matter is, accustom the child, or indeed anyone, to meet ordinary exposure by what one judges to be an ordinary amount of clothing, so as to leave something that may still be done when the emergency arises. Obvious enough, no doubt, yet we all know people without number who never can see it. If one has a weak throat, let us say, nothing will be gained by wearing a muffler habitually: that only further diminishes the resisting power of the part by diminishing the stimulus to resist at all. But if one increases the resisting power of the skin by cold sponging and reserves his muffler for the evening or for the specially cold day, he does his best to keep well.

CHAPTER X.

BANDAGING.

Roller Bandage—Bandaging of Regions—Immovable Bandages—Splints—Dressings—Preparations for Operation.

THE use of the triangular bandage has been so fully gone into elsewhere[1] that we need not consider it here.

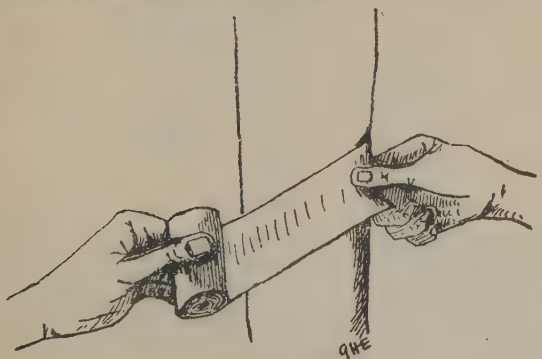

FIG. 1.

We shall therefore confine ourselves to a description of what is called the **Roller Bandage.** This bandage is composed of a strip of material of about 6 yards in

[1] *Ambulance Hand Book.* G. T. Beatson, C.B., M.D.

length and from 1 to 6 inches in width. The material most commonly used is unbleached calico, which is sufficiently strong and unyielding to exert pressure and to fix splints. In any application of the roller bandage it is well to have an assistant to hold the limb—in cases of fracture absolutely necessary.

To Make the Bandage, a piece of material,[1] of sufficient length, is *torn*, not cut, into strips of the required width. These strips are then rolled. In

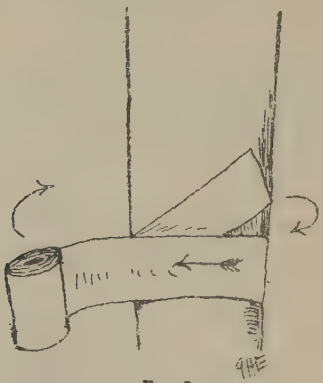

FIG. 2.

rolling the strip, one end should be folded on itself to a distance of two inches, and this should be again folded over. There is thus formed a thick and firm core which, when rolled, makes a suitable centre for the remainder of the bandage. The loose end of the bandage is termed the "tail," and the remainder the "body."

[1] Calico bandages are the most satisfactory for retaining splints in cases of fracture. Softer material (cotton, linen) is used for the retention of dressings. For bandaging swollen joints flannel is often used, as it possesses some elasticity.

If difficulty be experienced in rolling the bandage as above, a lead pencil or wooden knitting-needle may be used as a core. In that case the core is removed after the bandage is rolled.

To Apply the Bandage, the outer surface of the tail is laid on the patient's body or limb *obliquely*, and held there, between the finger and thumb, at a higher level than where it is proposed to commence

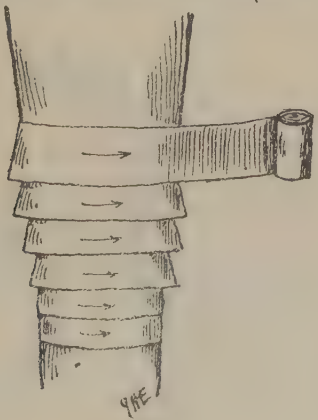

FIG. 3.

bandaging (Fig. 1.) The bandage is then carried round the part with its back towards the skin (Fig. 2), and succeeding turns gradually cover in the tail, and ascend the limb. The object of placing the tail obliquely is to enable it to be fixed during the first turn of the bandage. If laid straight, so as to be covered by the first turn, the bandage will slip. In bandaging the trunk or upper arm, the bandage is carried round in successive turns from the lower to the upper part of the limb or body in a **Spiral**. In the spiral bandage each

turn covers or overlaps the upper third of the preceding one. The spiral is only applicable to a part whose circumference is pretty much the same throughout its length. In the leg, thigh, and forearm the limb is more or less tapering, and if a spiral were applied the different turns would not lie flat, but would be loose below and tight above (Fig. 3). In order to avoid this, which is unseemly, uncomfortable, and inefficient, it is necessary

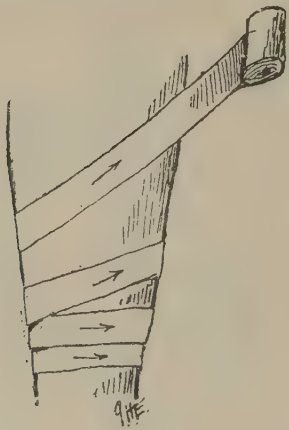

FIG. 4.

to make **reverses.** Generally, the first two or three turns of the bandage may be applied in a spiral, but as the circumference increases, attention must be paid to the *lower* edge of the bandage. This edge must lie flat on the skin. In a tapering limb, the bandage if kept flat on the skin while being applied will run up very obliquely and leave portions of the limb uncovered (Fig. 4).

To Make a Reverse. Fix the *lower* border of the

turn to be reversed by placing the thumb or forefinger of the unoccupied hand on it. Unroll the bandage away from the limb to a distance of 3 or 4 inches. Then carry the bandage towards the limb, so as to make the free portion quite slack. Turn over the body of the bandage *in a downward direction*, and the slack portion will then fold down, or "reverse," over the thumb of the other hand (Fig. 5). By then pulling on the body of the

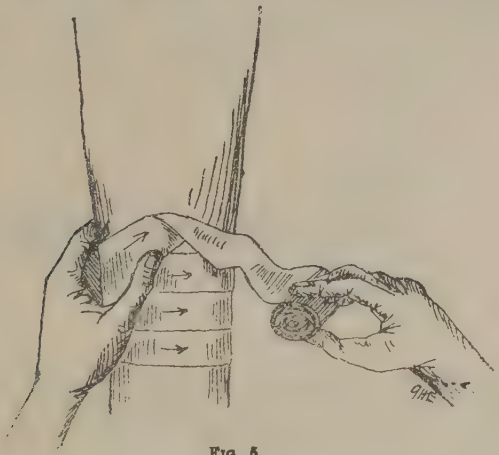

FIG. 5.

bandage the reverse will lie flat on the surface of the limb. The reversed bandage is then carried round behind the limb. The manœuvre is repeated, successive reverses being made in a direct line above the first. The bandage is finished off by one or two circular turns at the upper part of the limb. The appearance when the reversed spiral is completed is shown in figure 6.

To Finish off the Roller Bandage. The end is pinned down to the underlying turn with a safety-pin.

If such cannot be got, the following method may be adopted:—Split the end of the bandage to a distance of 12 or 15 inches (Fig. 7); make a half-hitch between the two halves to prevent the bandage tearing further; bring the halves round the opposite sides of the limb, and finish in a reef knot (taking care that the knot is not tied over any prominent piece of bone).

Figure of 8. This method of bandaging is in use in the neighbourhood of joints. One loop of the 8 embraces the limb above, and the other the part below the joint-region. It is largely used at the ankle-joint, and the

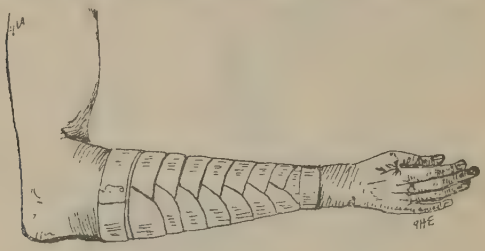

Fig. 6.

following is the method of application to that region. One or two complete turns are made round the foot (Fig. 8). The bandage is then carried up and once round the ankle then down and round the foot. Two or three successive turns are sufficient, and the bandage may then be fixed or continued up the leg as a reversed spiral. If it is desired to **cover the point** of the heel, elbow, or knee, a **modified figure of 8** is used. The first turn of the bandage is taken over the centre of the joint and successive enlarging loops are made alternately above and below the joint.

The **Spica** is a special form of figure-of-8 bandage. It is used in the following situations: the groin, shoulder,

great toe and thumb. The loops of the 8 are unequal in size; the large one passes round the body in the case of the shoulder and the groin, the smaller round the limb. In the case of the thumb and the great toe the large loop encircles the wrist and the ankle respectively.

In the spica of the *shoulder* and the *groin* the bandage is first fixed by a turn or two round the limb (Fig. 9), and then carried round the trunk and back round the

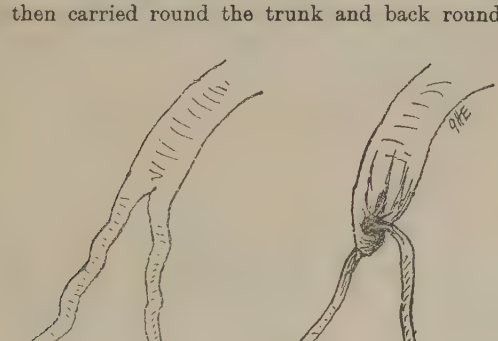

Fig. 7.

limb. A succession of turns is then made, each higher than its predecessor until the part is entirely covered in (Fig. 10).

In the spica of the *thumb* or the *great toe* the bandage is fixed by a few turns round the wrist or the ankle. It is then carried down to near the tip of the thumb or toe, round which it is taken and then passed up again and round the joint.

The **Capeline bandage** is used to cover in the head. It is a *double-roller*, *i.e.* a bandage with both ends rolled

up towards each other. It is applied with the patient in the sitting posture. The centre of the bandage is placed over the forehead, just above the eyebrows. The two parts are then carried round, one on each side, and crossed at the back of the head low down (Fig. 11). One part is continued round, the other is doubled up forwards over the top of the head (Fig. 12). It meets the other part at the forehead and is doubled back, the first part fixing the loop in position. This manœuvre is repeated, the subsequent portions of the bandage passing alternately to opposite sides, until the whole of the head

Fig. 8.

has been covered. The lowest loop on each side is covered by the final turn of the horizontal bandage (Fig. 13) which is then pinned over the brow.

Knotted Bandage for the Head. This bandage may be used instead of the capeline. It differs from the latter in being single, and in having turns taken under the chin.

The tail of the bandage is held over the temple on one side. The bandage is then carried round the forehead, the opposite temple and the occipital region; it is then brought forwards under the tail, round which it is turned and carried up over the top of the head, down on the other side and round under the chin (Fig. 14). It is then

carried up behind the tail (Fig. 15) and over the head, the successive turns passing in front of and behind the tail (which is purposely left long), and diverging alternately backwards and forwards. When the whole, or the desired part, of the scalp has been covered in the last turn is tied or pinned to the tail; or it may be carried from the

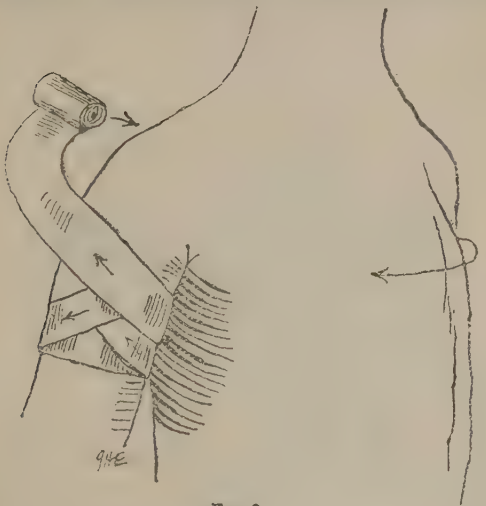

Fig. 9.

occiput to the root of the nose over the top of the head, and pinned down to the various turns, so making them all secure.

T-bandage. The bandage is made by taking a sufficient length of bandage, 3 or 4 inches wide, to encircle the pelvis. To the middle of the piece is knotted, or pinned, or stitched, one end of a second length of bandage (Fig. 16). To apply the T-bandage the girdle portion is tied in position; the second portion lies over the sacrum

and is brought forwards in the fork between the thighs. Where it lies on the fork the bandage is split down the middle into two portions, one of which passes up in front on each groin. Each portion is pinned or knotted to the front of the girdle-portion (Fig. 17). It is used for retaining a pad or dressing on the fork. The central portion, behind the split, should be pinned to the dressing.

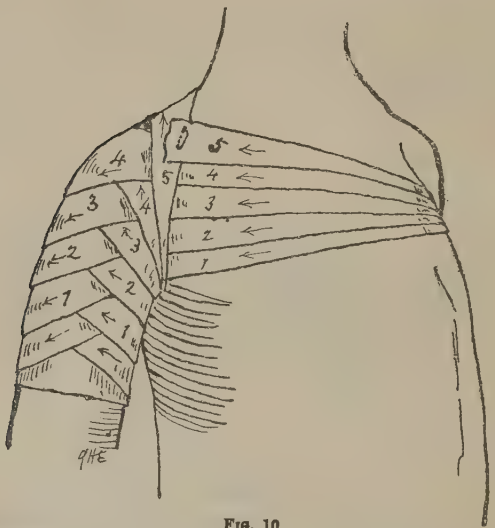

Fig. 10.

Scheme of Bandaging suited to the different regions of the body.

Head. Capeline, or knotted bandage (p. 129), 2½-3 in. wide.

Neck. Figure of 8, loops over head from brow to occiput and also round neck; crosses should be behind. If the wound is low down in the neck, the secondary

loops may pass round the trunk below the armpits; the crosses may be behind or in front. 2½-3 in. wide.

Shoulder. Spica (p. 128), 3-4 in. wide.

Upper Arm. Spiral (p. 125) or reversed spiral (p. 126), 3 in. wide.

Elbow. Figure of 8 (p. 128), 2½ in. wide.

Forearm. Reversed spiral (p. 126), 2½ in. wide.

Note. Always, before bandaging the upper part of the forearm, bend the elbow to a right angle. If this

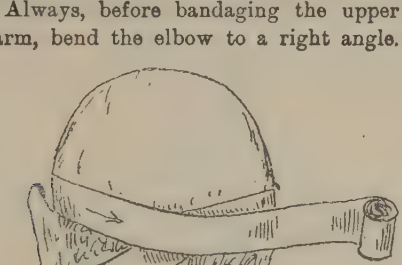

FIG. 11.

is not done the bandage will press on the vessels in front of the elbow when that joint is afterwards bent to let the forearm into a sling.

Wrist and Hand. Figure of 8 (p. 128), 2 in. wide.

Fingers. To begin with, always fix the bandage round the wrist. The finger is bandaged with reversed spiral (p. 126), the thumb with a spica (p. 128), 1 in. wide.

Chest and Abdomen. Spiral. 4-6 in. wide.

The breast is supported by a figure of 8, one loop passing round the chest below the breast, the other carried over the shoulder opposite to the breast which

is being supported. Successive figures of 8 cover in and support the breast from below upwards, 4-6 in. wide.

Hip and Groin. Spica (p. 128), 4 in. wide.

Fork. T-bandage (p. 131).

Note. Always carry the girdle-portion of this bandage immediately below the level of the haunch bone, otherwise the bandage will cause uncomfortable pressure on the abdomen if the bowels or bladder become distended.

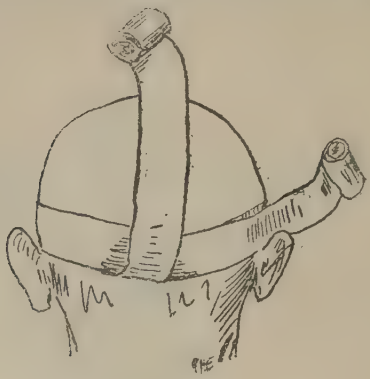

FIG. 12.

Thigh. Reversed spiral (p. 126), 3-4 in. wide.

Knee. Figure of 8 (p. 128), 3 in. wide.

Leg. Reversed spiral (p. 126), 3 in. wide.

Ankle. With or without heel, figure of 8, 2½-3 in. wide.

Toes. Reversed spiral (p. 126), fixing first of all the ankle. *Note.* The toes are seldom bandaged separately. Usually a triangular bandage is employed, taking in the whole foot. Boracic lint or cotton wool, dusted with boracic acid powder, should be placed between the toes to prevent chafing.

IMMOVABLE BANDAGES.

These are described so as to make nurses acquainted with the materials which will be required, and the steps employed in their application. *It is not intended that nurses should apply immovable bandages themselves.* These bandages are employed (1) in fractures, to secure fixation of the fragments, and (2) in the treatment of diseased joints, to secure fixation, and in some cases to exert pressure, on the joint. When used to apply pressure, a thick

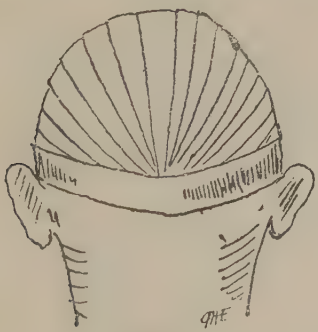

FIG. 13.

layer of non-absorbent cotton wool is wrapped round the joint and the bandage is applied over it tightly.

The immovable bandage which is most commonly used consists of a wide-meshed material (termed "crinoline") into which is worked dry Plaster of Paris. The dry plaster is rubbed into a strip of material of the desired width (1 to 4 inches) and of *three yards in length.* The bandage cloth is laid on a board on which is a quantity of plaster. The powder is rubbed into the meshes of the bandage by the palm of the hand, and the bandage is

then rolled *loosely*. When not intended for immediate use the plaster bandages should be stored in a tin box to protect them from damp.

To apply the Plaster Bandage. A vessel is required containing hot water of sufficient depth to cover the bandage when set on end. The skin is washed and carefully dried; it is then dusted over with some dusting-powder (Oxide of Zinc, Starch, etc.). A flannel bandage

FIG. 14.

is then applied. This protects the skin and gives the plaster a grip on the part. Sometimes wool is required to protect bony points. The plaster bandage is then placed on its end in the water. It should remain in the water until air-bubbles cease rising from it; this is a sign that the bandage is thoroughly moistened. It is then lifted out, the excess of water squeezed out and the bandage evenly rolled on the limb. The second and succeeding bandages should be placed in the water *shortly*

before the surgeon has completed the application of the one in his hand. A sufficient number of bandages having been applied, the surface is smoothed with the wet hand and the date scratched on (with a penholder, pencil, probe etc.). It is well to have handy some dry plaster to mix with water and rub in over the bandages that have been applied. This is not always necessary.

The water in which the bandages have been moistened should not be emptied into the sink in case of choking

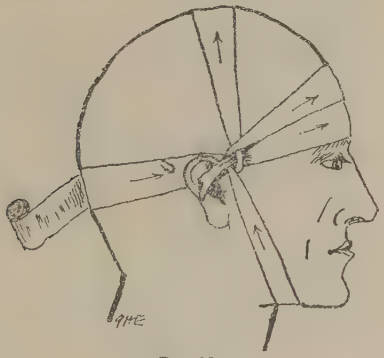

FIG. 15.

the soil-pipes. The plaster should be allowed to settle; the water is then poured down the closet and the sediment scooped into a paper and put out with the refuse of the house.

The plaster having been applied, the part so bandaged must be exposed to the air, or to the heat from a fire, to dry. In the case of a leg, the limb is raised off the bed by supporting the heel on a bowl turned upside down.

Plaster bandages usually remain on for six weeks, hence the necessity for the above-mentioned preparation of

the skin. They are comparatively easily *removed* by soaking the part for an hour or so in a hot bath and then partly unwinding and partly cutting the bandage. A solution of sugar in hot water acts very rapidly, softening the bandages in a few minutes.

Starch Bandages are made by passing an unrolled calico bandage through starch paste. The bandage is then firmly rolled on a piece of wood. A wooden or iron core is necessary as the bandage is slippery and

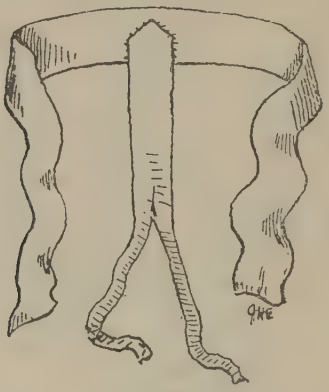

FIG. 16.

very difficult to roll. The core is kept in during the application of the bandage.

Strips of wood (veneer) or tin are often used to give additional strength; these are applied between the deep and superficial layers of the bandage. The advantage of the starch bandage is its lightness, but the long time (several hours) taken in drying and becoming firm is rather a drawback. It is not quite so rigid as the plaster bandage, and it is used more for applying fixation and pressure to joints than for cases of fracture.

SPLINTS.

Splints are used chiefly in cases of fracture, but also in any case in which it is desired to keep a limb at rest (as in certain joint-diseases). They are rigid, and are usually made of wood. In a work such as this it is not necessary to describe the various splints employed in the different parts of the limbs. *The nurse ought to know what is required in the application of splints generally.*

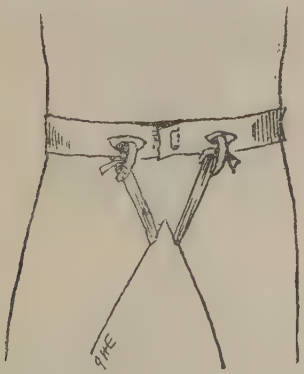

Fig. 17.

1. **Padding.** Splints are never placed next the skin; "padding" is interposed. Cotton wool is the padding usually employed. The whole of the inner surface of the splint should be covered with a smooth sheet of wool, and more is added to fill up the natural hollows in the limbs. If the splint lies over a bony point, the point should be protected from pressure, not by covering it, but by *surrounding* it with wool, so as to raise the splint off the prominence. This is accomplished by taking a piece of wool about 8 or 9 inches long and 2 inches broad and

twisting it to form a ring. The central hole is for the reception of the bony point; the ring of wool receives the pressure of the splint. This ring is called a "bird's-nest pad." It is used chiefly at the elbow and the ankle. It is also used to protect the heel and the lower end of the spine from the pressure of the bed when a patient has to lie for a long time on his back.

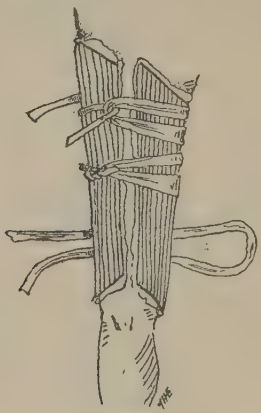

FIG. 18.

2. Bandaging. Splints are kept in position by the ordinary roller bandage applied as a spiral or spiral with reverses. There are *two exceptions* to this rule:

(*a*) In fractures of the upper arm and of the thigh, the splints are fixed by *looped ties*. The tie is made of a length of bandage of more than twice the circumference of the limb. This is doubled over to form a loop and two loose ends. The loop is passed under the limb, so as to lie at its inner side (Fig. 18). One of the ends is carried over the limb and passed through the loop; it is then drawn taut and tied to the other end. Generally three of

these ties are employed. The object of using them instead of applying a bandage is to avoid undue movement of the broken bone, such as would occur in the thigh and upper arm during the application of a bandage.

(*b*) In fractures of the thigh when the long splint is applied, extending from the armpit to beyond the heel, it is held in position by a *splint-sheet* round the limb and a binder round the body. The splint-sheet should be in length twice or thrice the circumference of the limb, and it should be broad enough to extend from the groin to the ankle. Its length allows of the splint being rolled up in one end of it, and so more securely fixed.

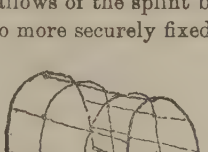

Fig. 19.

Caution. After a splint has been applied, one must examine the toes or fingers frequently during the first few hours. The object of this examination is to determine whether or not the bandaging has been tight enough to obstruct the *circulation* in the limb. One should press on the end of the finger (or toe) nail to drive out the blood. The part becomes quite white. On taking off the pressure, the nail immediately becomes red. If the splints have been applied too tightly, the fingers or toes are livid in appearance; this lividity is expelled by pressure on the nail, and returns slowly. In such a case the bandage, or ties, must be loosened. Again, when a patient complains of *pain* at a spot in the limb to which splints have been applied, do not make too light of it.

The pain is probably caused by excessive pressure, and may be the first indication of a pressure sore.

Cage. When it is desired to keep the weight of the bed-clothes off any part of the body or limbs a cage is made use of. These used in hospital are made of stout iron wire, and are of the shape and appearance seen in Fig. 19. A cage may, however, be easily improvised in a private house. The cage is most often used in cases of fractures of the lower limb, and its object is to prevent the bed-clothes pressing *on the toes* of the injured limb.

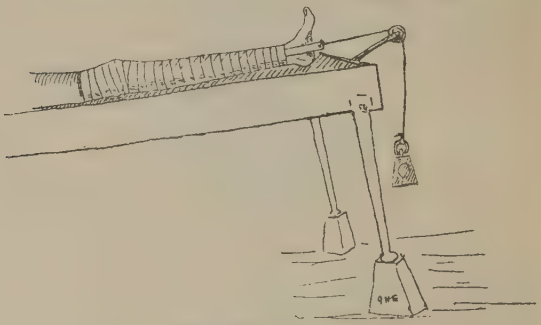

FIG. 20.

Such pressure causes great discomfort, and to avoid it the patient places the foot in a faulty position. A cage may be improvised from a bandbox. The lid is removed, the box turned upside down, and a piece cut out of one side to admit the leg.

Extension-Apparatus. In the treatment of fracture of the thigh, and in some cases of fracture of the leg, the surgeon applies *continuous extension* with the object of keeping the fragments in position. To this end, a strip of adhesive plaster is applied to the outer and inner sides of the limbs. The plaster should reach up to the seat of

fracture, and is further fixed to the limb by a bandage. The lower ends of the plaster strips are left long, and to them is affixed a weight which passes over a pulley at the foot of the bed. The gradual slipping down of the patient is prevented by raising the foot of the bed on blocks, about 6 inches high (Fig. 20). The weight required for an adult would probably be about 7 or 8 lbs.

Pillows are used to support the limbs in some cases of injury or fracture. For such a purpose the ordinary pillow is placed under the limb, which is then fixed to it by looped ties. *Sand Pillows* are made of canvas or stout calico, and are filled three-quarters full with sand. By their weight they steady a limb, and are used in some cases of fracture in the neighbourhood of the hip. The reason for only partially filling the pillow is to allow of its being moulded to the limb, which is thus better secured.

DRESSINGS.

No one can understand the principles of the modern dressing of wounds without some knowledge of the causes of wounds becoming contaminated. It is therefore well to pay attention to the fact that the primary danger to wounds is the presence of *micro-organisms*. These are spoken of indifferently as "germs" or "bacteria," and the study of these microscopic bodies is termed *Bacteriology*.

It is not necessary for us to enter here into the many details connected with the study of bacteria. Suffice it to say that these micro-organisms, while scattered everywhere, are found chiefly *in the skin*. If this fact be grasped, the care of wounds is easily understood.

When bacteria gain entrance to a wound, they feed on the juices of that wound, and increase and multiply

to an enormous extent. In the course of living and multiplying they form poisonous matters which are called *toxines*. These, if in sufficient amount, cause feverishness, sickness, and diarrhœa, and the patient is said to suffer from *blood-poisoning*.

The aim of present-day surgery is to prevent, as far as possible, the entrance of the germs into the wound, and so to help Nature in her efforts toward healing. We say "as far as possible," because it is impossible to keep out germs absolutely. Some always gain entry into every wound, but if this number is small the cells of the body kill them off, so that they are unable to exert a harmful influence. Let the number of germs be increased ever so little and poisoning will take place. If the poisoning be slight, the result is that the wound *suppurates*, *i.e.* instead of healing quickly, the edges gape and there is a discharge of thick greenish-yellow matter which is called *pus*. Apart from the danger of such poisoning spreading and causing general blood-poisoning, the effect on the wound is that healing is delayed, and that instead of a small scar an unsightly mark is left. It is the endeavour of everyone who has to do with the dressing of wounds to prevent suppuration occurring, and to accomplish this it is necessary to direct one's efforts to the destruction of the microbes.

In order to destroy microbes we make use of certain substances called **germicides** or **antiseptics**.

The first and most generally useful of these antiseptics is **carbolic acid**. The pure crystals of the acid are liquefied with water, and this syrupy liquid is used in the form of watery lotions. Of these the *strong solution* is made by adding 1 part of liquefied carbolic acid to 19 of water (*i.e.* 1 in 20). The *weak* solution has a strength of 1 in 40. The strong solution is used to purify the skin (see below) and soiled wounds and

also in compound fractures. Its action is, however, too strong for ordinary operation wounds, and 1 in 40 solution is used for these.

Liquefied carbolic acid from which carbolic lotion is prepared is an oily liquid. It has been swallowed in mistake for castor oil, and should be kept in a poison bottle, distinctly labelled. The same caution applies to the lotions. When spilt upon the skin it whitens it. Its corrosive action is checked by applying oil or alcohol to the whitened surface.[1]

Another antiseptic which is widely used is **corrosive sublimate**, or perchloride of mercury. It is used in much weaker solutions than carbolic acid, viz., 1 in 1000 and 1 in 2000. It has the disadvantage of *spoiling surgical instruments.*

Iodoform is in the form of yellow crystals with a strong disagreeable odour. Its power as a germicide is chiefly exerted against the bacillus of tuberculosis, and it is therefore largely used in the dressing of tuberculous wounds. It is also used in suppurating or foul wounds, which are quickly disinfected by its action.

For dusting on wounds it is used either of full strength or made up with boracic acid powder in the strength of 1 of iodoform to 2 of boracic acid.

Boracic acid is another antiseptic, but it is a much weaker germicide than any of the others. The solution is made by dissolving the crystals in boiling water. When the water cools, the excess of the acid crystallizes out in the bottom of the vessel, and the clear fluid forms the saturated solution, of strength 1 in 30. It is chiefly used as a lotion for ulcers and superficial wounds.

Many surgeons at the present day do not care to use strong antiseptics to an operation-wound. For the pur-

[1] In preparing Carbolic lotion care must be taken to dissolve the acid *completely* by thoroughly shaking the mixture.

pose of washing the wound they use **boiled water**, *i.e.* water which has been boiled for half-an-hour, so as to destroy all the microbes in it; it is then placed in a jug or ewer, the mouth of which is covered with a towel, and allowed to cool. It is used at a temperature of 100° F. Such water is germ-free, but has no power of killing germs; it is said to be *aseptic*, not antiseptic.

For some purposes common salt is added to the water before boiling; the proportion is 1 drachm (Apothecaries' Weight) of salt to 1 pint of water. This is called **Saline Solution.**

Dressings. The dressings which are used are generally impregnated with a chemical antiseptic. The antiseptic prevents the discharge, which soaks into the dressing from the wound, from putrefying, and so helps to prevent wound contamination.

Antiseptic dressings are each stained a distinctive colour; those commonly used are:

Cyanide Gauze, - - - -	Heliotrope.
Sal Alembroth Gauze, - - -	Blue.
Iodoform Gauze, - - - -	Yellow.
Boracic Lint, - - - - -	Pink.

Of these the first is very commonly used at the present time. Before being applied it is damped with Carbolic Solution (1 in 20). The object of the damping is to kill any germ which may have got into the meshes of the gauze after manufacture.

Iodoform gauze is prepared by soaking gauze in a solution of iodoform in ether. The gauze is then hung up to dry, after which it is cut into strips. These are folded to make bands of the various sizes suitable for packing into wounds. When so used, the material should be folded so as to have the cut edges inside, and so prevent loose threads sticking into the wounds

and remaining when the packing is removed. It may also be used in flat pieces to lay on a wound in the same manner as the other gauze dressings. The gauze should be kept in a covered vessel and should be moistened with carbolic lotion (1-20) before use.

Boracic lint is largely used as a dressing for ulcers. It is applied moistened with boracic lotion, and is covered on its outer side with oil-silk or guttapercha tissue. The object of this covering is to keep the lint moist, and so prevent it sticking into the surface of the ulcer. The dressing should be just a little larger than the ulcer, and the oil-silk or guttapercha tissue just large enough to overlap the lint.

If antiseptic dressing material is not obtainable, a dressing of plain lint or gauze may be applied. Any germs which are in the material used are to be destroyed by boiling it before use. This is called *sterilizing the dressings.* For this purpose an ordinary kettle, or, better, a fish-kettle, may be used.

It is customary to apply over the dressings a pad of cotton wool (*Gamgee tissue*) or *wood wool tissue.*

Preparation of the Skin before an Operation. The patient should first of all have a *bath*; if this be not possible, the surface should be washed in small portions at a time, the remainder of the body being kept covered. In the special preparation of the site of operation, *a wide area of the surrounding skin should be prepared,* so that if the surgeon's hands touch it during the operation they will not soil the wound.

The various steps are as follows:

(*a*) *Mechanical cleansing* by hot water, soft soap, and a nail-brush. This removes coarse dirt, including the superficial parts of the scarf-skin. In the course of the rubbing the glands in the skin pour out sweat and oily matter, and, along with this, some of the micro-organisms

which lurk in the mouths of the glands. The part, if hairy, should be shaved.

(*b*) *Wiping off the greasy matter* by rubbing the skin with a piece of lint or gauze wet with *turpentine.* The turpentine, if left on the skin, would blister it, and it is therefore partly removed by a dry piece of lint.

(*c*) The remainder of the *turpentine is removed* by rubbing the skin with a swab of lint or gauze wet with *methylated spirit.*

(*d*) Application of a *chemical antiseptic* to soak into the skin and destroy what microbes remain. The most suitable chemical agent is watery solution of carbolic acid (1 in 20). Lint is soaked in this solution, and applied to the part half an hour before operation. The lint is covered with waterproof material (jaconet, etc.), and is bandaged on the part. Sometimes the skin is prepared the day before the operation is performed, in which case weak carbolic lotion (1 in 40) is applied and allowed to remain on overnight.

Children are specially susceptible to the poisonous action of carbolic acid lotion, even when applied to unbroken skin. The first sign of poisoning is that the urine becomes of an olive-green colour, which turns much deeper when the urine has stood for some time. If this sign be not acted on (by removing all carbolic applications), the patient becomes faint, white and clammy, and perhaps sick, and the pulse at the wrist may be felt only with difficulty.

The nurse's hands are cleansed in the same way as the patient's skin, except that she holds them for five minutes in a basin containing strong carbolic lotion. If she is helping at the operation, she frequently during the course of the operation dips her hands in weak carbolic lotion (1 in 40).

For Operations carried out in the patient's house, an **operating-room** has to be prepared.

In such a room the carpet should, if possible be lifted, and the furniture removed. The walls also should be rubbed down the day before. If not feasible to remove the furniture or lift the carpet, these articles may be covered with clean sheets, some hours before the operation takes place. The *temperature* of the room should be about 70° Fahr. as ascertained by wall-thermometer.

Operating Table. The kitchen table, previously well scrubbed, is very suitable. If not long enough another table may be placed crosswise at one end. The table is covered with a blanket, over which is placed a waterproof, which again is covered with a clean sheet.

The *patient* should have the parts which are not to be exposed protected from cold by woollen materials (long stockings, semmits, etc.), and he should as far as possible be covered with a blanket.

When the seat of operation is exposed, the clothes and neighbouring parts of the body are to be covered by towels.

Directions as to medicines and diet before the operation will be given by the attending physician or surgeon.

In addition to the operation table, *tables* or *chairs* will be required for the following.

Flat dish for instruments, containing carbolic lotion (1 in 40).

Dish (small bowl) for ligatures, containing carbolic lotion (1 in 40).

Dish (small bowl) for stitches and needles, containing carbolic lotion (1 in 40).

2 Basins for the sponges, one containing carbolic lotion (1 in 40), the other boiled water.

The sponges are wrung out of the carbolic lotion and handed to the surgeon. After being soiled, they are

rinsed in the basin containing boiled water, and then immersed in the first basin in the carbolic lotion, out of which they are to be wrung before being used again.

The order in which the dressings are applied is :

(1) Antiseptic gauze.
(2) Wool pad.
(3) Bandage.

Note.—If the surgeon is going to drain the wound, the *drainage-tube* will be asked for *before the dressing.* Always have a stitch in a needle ready for the tube. Sometimes the surgeon fixes a safety-pin into the tube instead of a stitch. The object of the stitch or pin is to prevent the tube slipping in and becoming lost in the interior of the wound.

While the patient is on the operating-table, his bed should be kept warm by hot-water bags or bottles. These should not be allowed to lie against the patient when he is put back into bed. He is very often not quite conscious and the hot bottle may cause a nasty burn by his not being sufficiently awake to complain of the heat or to remove the bottle. A blanket should be placed between the bottle and the patient's skin. Towels and sheets which may have become soiled with blood during the operation should be steeped in cold water for some hours to remove the blood. They should then be boiled.

Subsequent Dressing. The following should be prepared for the subsequent dressing of the wound :

(1) Basin, hot water, and soap (for the surgeon's hands).

(2) Basin for antiseptic lotion.

(3) Dressing materials (kept wrapped up in clean towels).

(4) Towels to cover bed and bedclothes ; sometimes a mackintosh sheet.

APPENDIX.

WEIGHTS.

gr. j	signifies	one grain.	
℈ . j	„	one scruple	=20 grains.
ʒss	„	half-a-drachm	=30 grains.
ʒj	„	one drachm	=60 grains.
℥ss	„	half-an-ounce	= 4 drachms.
℥j	„	one ounce	= 8 drachms.
lbj	„	one pound	=16 ounces.

FLUID MEASURES.

♏j	signifies	one minim (about one drop).
fl.ʒj	„	one fluid drachm =60 minims=one tea-spoonful (old size).
fl.ʒij	„	two fluid drachms=one small dessert-spoonful.
fl.℥ss	„	half-a-fluid ounce=one small table-spoonful.
fl.℥j	„	one fluid ounce =two small table-spoonfuls.
Oj	„	one pint =twenty fluid ounces.

NOTE.—The numbers are written *after* the symbols, and in Roman characters; thus ʒiv signifies 4 drachms.

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